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Personal Computing Today

AUGUST 1983

75p

Add-on
Action Inside

KEES v K.

THE AQUARIUS
Mattel's
rising star?

TI TACTICS
A strategy
game to play

**Software to
key-in for
Commodore 64,
VIC-20, BBC,
TI99/4a,
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Oric,**

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Game design and dragonware: R. Lowry

Cosmic Defender – for the BBC model B

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Game design and dragonware: R. Lowry

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Personal Computing Today

VOLUME 2 NUMBER 1 AUGUST 1983

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This month *Personal Computing Today* has its first birthday. Marking our first anniversary are reviews, programs, and features galore.

The newly released **Aquarius** computer has the wraps taken off it by our reviewer. We give you all the technical, practical and price details of one of the latest computers to be on sale. It will be interesting to see whether or not this computer, produced by a toy manufacturer, will fare as well as the Dragon — also developed and brought out by a toy firm. At one point the Dragon was selling so well that the manufacturer was having trouble meeting the demand for the machine.

On the program side there's plenty of variety for micro owners. Commodore users can make the most of a great adventure game which runs on the VIC 20. Based in and around Jerusalem it's a game of quick-thinking and strategy called the **Citadel** in which you must defend a citadel against a band of evil-minded brigands. A character defining program comes to you in the form of **Character Builder** which BBC Micro owners will find useful.

Getting into the summer frame of mind is a program for arcade game fans in an amazing game called **Krazee Kong**. It follows the pub arcade game fairly closely and runs on the Atari computer.

Our first Commodore 64 program takes the form of a classic computer game, **Grand Prix**. This shows just what the Commodore 64 can do and gives users a good opportunity to try out various facilities of the computer.

Regular features include peripherals reviews in **Add-on Action**, piles of programs under scrutiny in **Software Reviews**, the **Factfile** for prospective buyers to peruse, and the **Software Checklist** for you to check out software for your computer.

Don't forget *Personal Computing Today* is always on the lookout for good articles to publish. If you have written an article about a certain aspect of programming for a particular computer, or come up with a good idea for a program why not send it in to us for possible publication in the magazine? If you submit a program to us don't forget to include typewritten details on How it Runs, Hints on Conversion as well as a cassette with full loading instructions and a clear printout of the listing.

One vital thing, remember to put your name, address and telephone number on your article/program submission. All material which we publish is paid for and if you don't give your address we cannot get in touch with you to let you have your hard earned money.

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the page for a full
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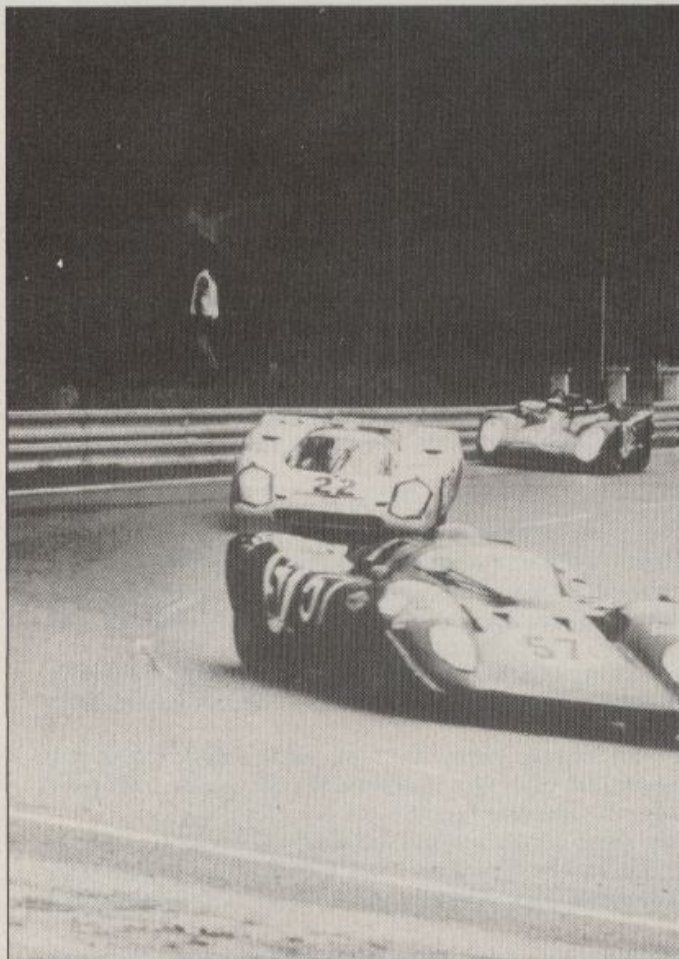


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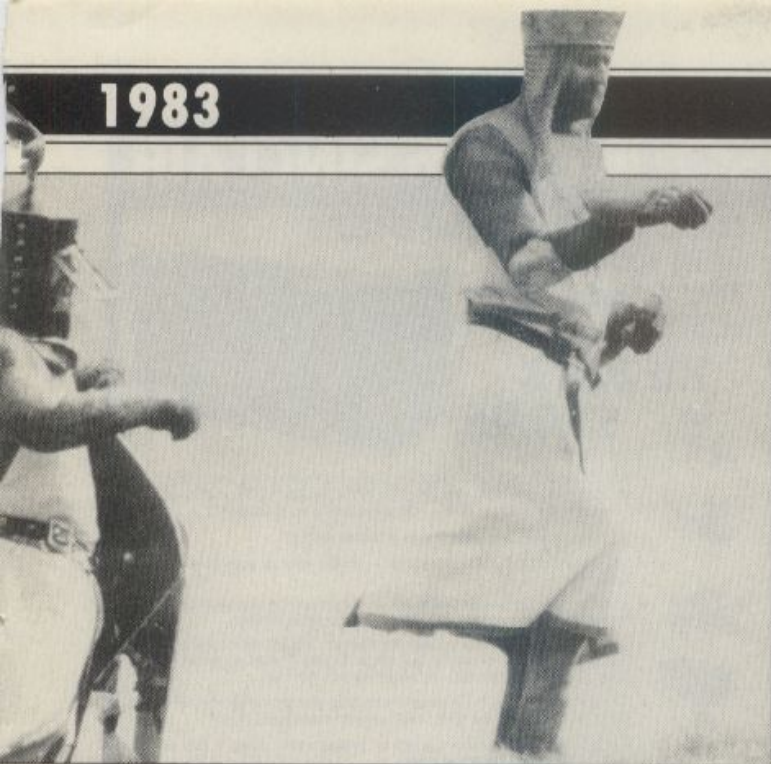
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1983

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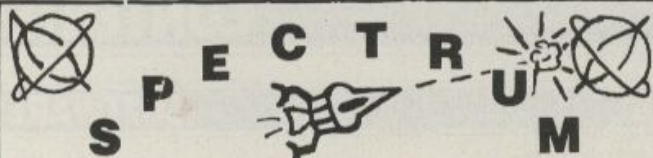
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NEWS NEWS NEWS

Bytes With A Beat

Nowadays, the videos which accompany pop singles are getting to be quite commonplace. EMI records however have gone one step further with their latest release. The single, called Camouflage, features a rather different B-side. Flip the single over and you have 3 computer programs for the ZX81.

The first of these programs is designed to run in conjunction with the A-side of the single. What you do is load the program off the B-side into a 16K ZX81. You then flip the single back and play the A-side. As soon as you hear the music start, push a key on the keyboard. The ZX81 will now keep pace with the song, delivering the lyrics as they are sung and providing a graphics display at the same time.

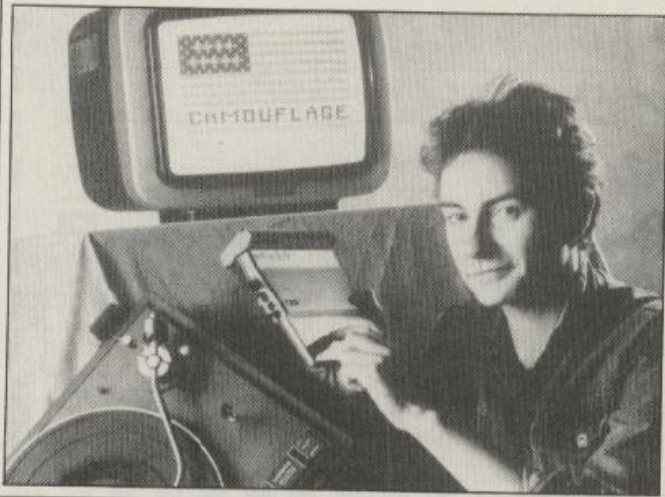
Complimenting the video-program on the B-side are two arcade style games. Called Flying Train, the game has you trying to land the top half of a steam train onto the carriage which is parked in the sidings. The third program is a 1K version of the same game.

The brains behind the single is a 27-year old Mancunian rock entrepreneur, Chris Sievey. He has been recording songs from as far back as 1974 including the intriguing 'I'm In Love With The Girl On The Manchester Virgin Megastore Checkout Desk'.

The whole project started at the beginning of the year when Chris bought a ZX81 to help him put titles on a video he was working on. He wrote the Flying Train game in the first few months. He then carried the idea further and ended up with the computer video. He approached EMI with the package at a time when they were getting increasingly worried about the loss in record revenue, it mainly going to the manufacturers of computer software. EMI saw the possibilities of the record/software combination and released the single.

EMI are being guarded at the future of these computer singles, but if Camouflage is a success then we could see a lot more of these sort of things. In fact, records could be the big new way to buy software, especially when you compare the price of single to the price of a software cassette.

Who knows, maybe *Personal Computing Today* will be running a Top Ten in the near future. By the way, the single's great.



Comx Coming

Just come onto the computer scene is the made in Hong Kong Comx 35.

Its vital statistics are a price tag of £119.95, colour graphics, and a built-in joystick. Made and sold through UK distributors by Kowloon based Germaine Video it should be on sale any time now. The Comx 35 is oblong in shape and coloured black and gold with black keys.

Design wise it is intended to be used for a whole spectrum of applications, some of those cited by Alsy Computers (the UK name of the Hong Kong firm) are scientific, educational, business and for your own entertainment from games playing.

It has an impressive list of facilities and capabilities including the fact that it is based around the same processor used by America's NASA satellites and the Space Shuttle. Because of this, reads the advertising blurb, the Comx 35 has

'superb graphic and sound capabilities'.

There is 32K of user memory available, which is expandable up to 667K, and 16K ROM of 'super enhanced BASIC'. Screen size measures up to 24 rows x 40 characters of high resolution graphics, which is pretty standard. Altogether there are eight background colours and the same number of foreground colours, with a 12 combination of colours and characters for your use.

Scheduled for production from June are several peripherals including a standard RS232 interface, a four colour printer and plotter, 5 1/4 inch floppy disc drive, an expansion box and a speech synthesiser unit.

Just how the new Comx 35 stands up to a real test of usage read for yourselves in next month's copy of *Personal Computing Today*. We have had the machine on test and will present you with a full review in our September issue.

PractiCalc-ly Speaking

Practical help is now on hand for business Commodore 64 users.

Marketing Micro Software has recently brought out PractiCalc which the firm claims to be 'the first professional spreadsheet for Commodore 64 and VIC-20 users'.

It costs only £30 and is available on disc or cassette and contains some functions not usually included in similarly priced programs. These are a fast 'seek and search' facility which can find individual areas or throughout the entire spreadsheet, and a 'sort' function which rearranges data from lowest to highest, or vice versa. It

also handles graphics if required.

The makers claim that the screen presentation is remarkably clear and has a four colour display. It performs over 20 mathematical calculations including all BASIC functions and can carry out row and column operations.

PractiCalc also runs on a VIC-20 with 16K memory yet the firm says it offers as much problem solving ability as programs costing three times as much.

For further details contact Marketing Micro Software, Goddard Road, Whitehouse Industrial Estate, Ipswich, Suffolk. Alternatively, try telephoning 04373 462721.

NEWS NEWS NEWS

Painting by Computer Numbers

Artificial intelligence fans who have an artistic bent will have to make a trip to London's Tate Gallery to see a special exhibition of computer executed drawings.

British artist Harold Cohen has been heavily involved in computerised drawings for fifteen years and his program named Aaron is the latest result of his work with artificially intelligent machines.

Cohen has written the program Aaron to produce drawings using his own knowledge of image-making. He has applied this knowledge to enable a computer, a DEC VAX-750 mini computer, to generate in infinite number of unique and original drawings.

The pictures produced are not what people traditionally believe to be computer graphics — straight lines, and blocks of colour sometimes forming amazing patterns on a screen. Cohen's computer produces pictures from the artists' own conceptions of art. The results are abstract line drawings, which you would think had been done by a person.

Cohen's drawing machine looks very much like a plotter. The equipment used in this exhibition are four computer driven drawing machines. Each machine is linked to its own computer and these are hooked up to the main DEC machine which is the host computer. The drawings are made by a pen attached to a long arm which is driven by two motors and programmed to respond to the master program.

Open from June 8 until July 24 this year the exhibition is being held at the Tate Gallery on the embankment near Waterloo and Embankment tube stations. It is on show in galleries 47 and 48 and for further information telephone the Tate Gallery on 01 (if you're outside London) 821 1313.

Virgin Goes Gaming

Recently record companies have been spreading their wings into the computer field and Virgin is no exception.

The latest trick is a clever marketing ploy in the form of putting a computer program on one side of a tape and music on the other. Virgin has just signed on its first batch of would-be whizz-kid programmers who are supposed to be bursting with hot games ideas with which to stun the world.

And Virgin has plans to put the rock singer Steve Hillage, who records on the Virgin Records label, on the reverse side of the first commercially available Virgin products.

These were released in mid-June and unfortunately

just missed our deadlines. But *Personal Computing Today* should be taking a look at some of them in the next issue's software review pages.

Virgin launched into the computer scene in February of this year and put out a plea to all programmers with a talent for producing original games programs to get in touch. The firm's managing director Nick Alexander said: 'We had a fantastic response with over 500 games sent in, and the overall standard was so high that it made the selection process very difficult. The final choice of eight games was determined by their originality and entertainment value.' The eight authors aged between 16 and 32 were consequently signed up by Virgin Games.

A Baron Full of Laughs

In between today and the last issue of *Personal Computing Today* the improbably named Baron Ironblood built a giant combat machine in the form of a giant cobra.

Not any old cobra though. This one drops venom from its fangs and emits deadly laser beams from its eyes. The Action Force had better watch out. Their recruits can either be vaporised to reappear at enemy headquarters or beamed up (just like Scotty) into captivity.

But all is not lost in this latest video game from Parker Video running on the Atari VCS. The Action Force recruits can be protected by an atomically powered energy shield and can retaliate with eight well-aimed shots between the giant cobra's eyes. That ensures instant death.

Perhaps Baron Ironblood isn't that bad after all. This game displays an interesting feature altogether lacking in contemporary video games. The player can choose which side he wants to support.

As the Action Force leader, your aim is to destroy the cobra while protecting your recruits. But if you take the part of the cobra, the object is to capture all four Action Force recruits.

Action Force features 'eye-catching' graphics and four difficulty levels and can be played by one, two or three players. If you take the three player option the game really gets going with both paddles and joystick in use in a two-against-one battle with the enemy.

Parker's new game costs £29.95 and is on sale at all Parker retail outlets.



Colour Genie

In the July issue of *Personal Computing Today* the price of Lowe Computer's Colour Genie was incorrectly stated. The

correct cost of that computer is £195.20 excluding VAT. Our apologies to Lowe Computers for the misprint.



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Eventually all the Time Lords exhausted their numerous energies or were killed, and the master race emerged to continue life into the infinite.

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NEXT MONTH

Our featured machine in the September issue of *Personal Computing Today* is the COMX 35. This machine follows the trend towards more powerful, lower priced computers. Priced at £149.95 including VAT, the COMX packs quite a punch.

The COMX is based around the 1802A processor which apparently found its way into a lot of NASA projects, including the Space Shuttle. The BASIC is contained in a 16K ROM. Expansion memory is available up to 67K.

COMX has a joystick built into it. Full colour and sound are also provided.

So does the COMX stand up to its rivals? You'll have to buy the September issue of *Personal Computing Today* to find out.

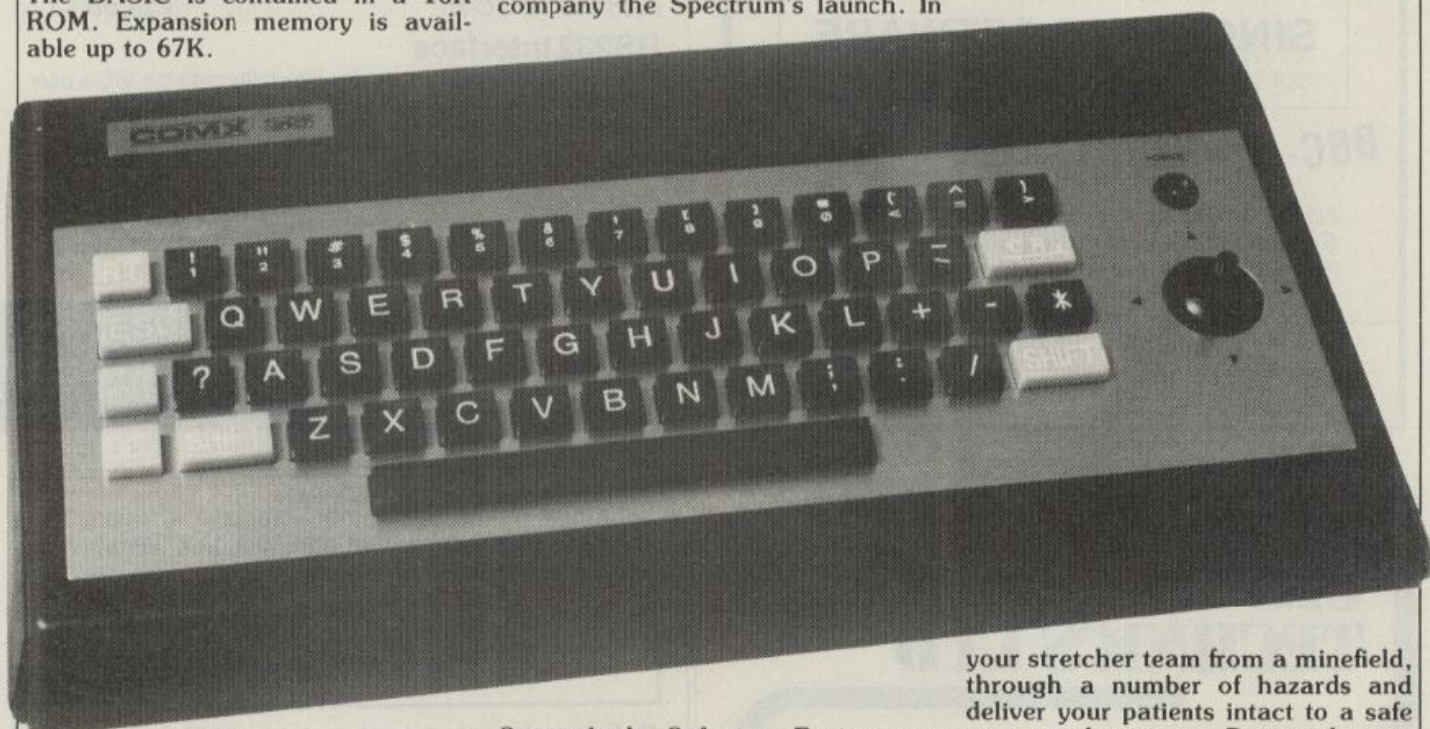
Software Reviews Business Focus

Psion software made their name by providing a lot of software to accompany the Spectrum's launch. In

found on any professional or business micro. VU-CALC is a spreadsheet program which will allow you to analyse tables and reports and explore 'what if' situations.

Piles of Programs

Among the programs for you to type in to your computer is a rather novel Spectrum program called Bomb Run. In it you have to steer



Unlike many computers in this price range the COMX sports a full size keyboard with 55 moving keys. Another interesting feature is that the

September's Software Reviews we take a look at two of their latest releases, this time for the increasingly popular BBC Micro. They have taken VU-FILE and VU-CALC from their Spectrum range and converted them to run on any 32K BBC computer.

These two products are aimed at the more serious micro user. VU-FILE is an information retrieval system and can be used to compile and access all sorts of files, lists and data bases. VU-CALC represents one of the most useful packages to be

your stretcher team from a minefield, through a number of hazards and deliver your patients intact to a safe area on the screen. During the run you have to cope with a steady rain of bombs and the occasional 'flitter'. So get your armbands on and join the battle.

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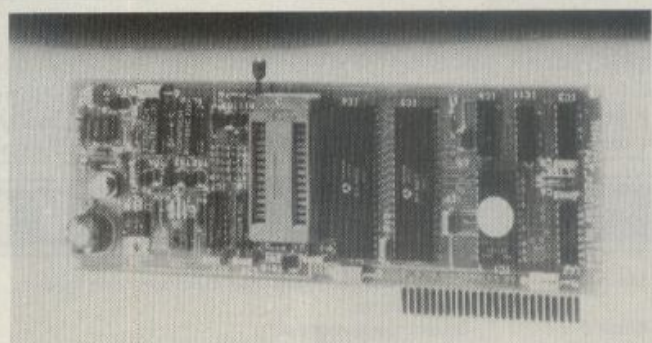
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GRAND PRIX 64

Put the pedal to the metal in C. R. Wright's fast and furious '64 program.

64 Grandprix is really a very souped-up version of the simple game that beginners wrote when PETs and Superboards were the most popular computers. Inevitably, times have changed and the Commodore 64 is somewhat more advanced than those, now outdated, computers!

This program, therefore, takes advantage of the better features of the machine like user-defined graphics, colour sound effects etc... to give you an addictive, fast moving game for the player with a sharp eye.

The program itself, i.e. the BASIC part, takes 5.3K of memory but you will find that after running the program you seem to be only left with 4½K. This is because that

memory is reserved for user-defined graphics. Not all of that space is needed but you shouldn't need to use any other programs at the same time as Grandprix I hope.

The idea of the game is to get as far into the racetrack as possible. Instructions are in the program and there are 9 levels of play, level 9 being the hardest. More points are gained on higher levels, so that all the scores are scaled up or down so as to make it fair on those who have a harder game.

My hi-score is 8478 on level 9! But this was only after 3¼ hours non-stop attempts!! Do not despair if you only find yourself getting a score of 432 or something as this

was my average score to start with. If you get the hi-score a tone will be heard before it is printed.

The listing is quite straight forward, but remember to type 'shift' spaces where indicated otherwise there will be a bug in the program and it will not run effectively. Good luck anyway and do write to us if you beat 8478!

Those of you who are getting frustrated by the 64's lack of commands covering sound and graphics will be pleased to hear that C.W. Wright has also written a package called BC BASIC which provides a lot of extra commands to enable you to handle sound, graphics and colour easily. He is hoping to market it so watch out in the reviews section for further details.

HOW IT RUNS

Lines 2-3	Set up screen, jump into machine code loader, more set-up
Lines 5-9	Instructions request
Lines 10-13	Set-up sound variables and clear score
Lines 20-25	Print up coloured Grandprix 4 times
Lines 30-80	Grandprix sign subroutine
Lines 90-190	Initial graphics routine
Lines 200-216	Select level 1-9 and calculate scale factors etc...
Lines 217-240	Set-up track variables and start game
Lines 250-302	Display car and track with obstacles at random
Lines 305-306	Check for crash, if not re-display car and delay

Lines 308-320	Increment score, read keyboard, react and return to beginning of main program loop at 250.
Lines 500-740	Game over routine, print scores, hi-score, repeat?
Lines 1000-1180	Instructions routine
Lines 2000-2070	Machine code loader routine
Lines 3000-3060	User-defined graphics m/c loader data
Lines 3080-3130	User-defined graphics data
Line 4000	Click: sound subroutine
Line 4100	Hi-click: sound subroutine
Lines 4200-4220	Explode: sound subroutine
Lines 4300-4320	Fading tone: sound subroutine
Lines 4500-4610	Level of play mathematical conversions

VARIABLES USED

HS	High score
A\$	General purpose input
SN	Start address of SID chip
HN	High frequency POKE address
WV	Waveform POKE address
CL\$ (1-4)	Colour variables
K	Same as I
L	Same as A & delay time
PL	Colour screen POKE address
D	Random number generator
Z	Delay variable
TR\$ (1-17)	Track variables

S	Score or number of positions moved
LN	Low frequency POKE address
VL	Volume POKE address
AD	Attack/decay POKE address
I	General purpose loops/delays
A	Used for keyboard input values
PC	Character screen POKE address
TA	Tabulation Value of track
F,E and T	Tabulate variables
LE	Scaling-up factor of score
E	Also used to load machine code
Q	Used for volume decay in 'explode' and 'fading tone' routines



HINTS ON CONVERSION

It shouldn't be too hard to convert this game to another machine but watch out for colour pokes if your machine is mono. The 64 screen locations are from 1024 to 2023 and the colour locations for each square at 55296 to 56295. A list of variables is printed below which makes it easier to convert. POKE53280,6 and POKE53281,9 in line 2 set the border to blue and the screen to brown (black is probably better for machines like the Spectrum of BBC). POKE646,15 sets the ink colour. GETA\$ in line 6 is like INKEY\$. In line 160 MID\$ is the character in MS\$ at position K. PEEK(197) is the keyboard scan and can be replaced by INKEY\$ again. The shifted spaces in lines 217-219 are to stop the car

leaving the track, they are probably best replaced by double width track borders instead. The POKE808,239 in line 2070 and POKE 808,237 in line 740 are to disable and re-enable the break or run/stop key. The machine code is the hardest to convert unless you have an assembler. It is in standard 6502 assembly language and it copies the character ROM into RAM and a few other POKEs to decide where to situate it. If you have a machine like a Spectrum, Oric, BBC or whatever, it is probably quicker to use the already existing user defined graphics facilities from BASIC. Good luck!!

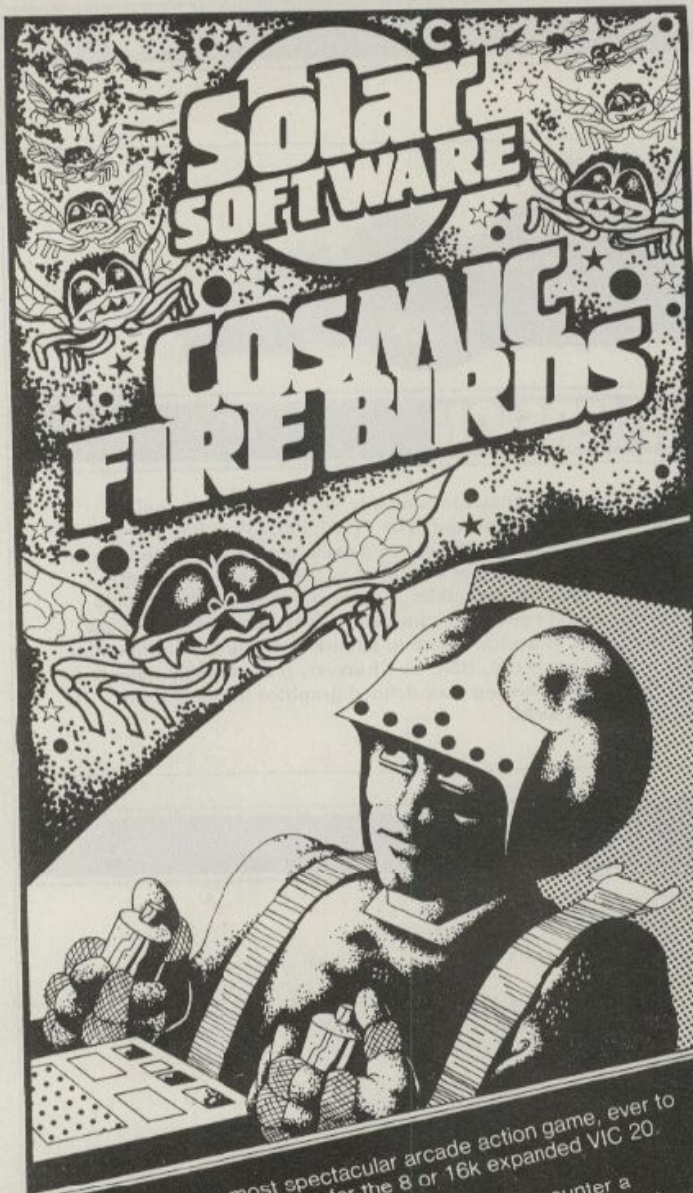
PROGRAM LISTING

[illegible]

```

520 FORK=1050 NEXT NEXT:GOTO54200
530 PRINT"3"
540 PRINT"MOVOUR SCORE HPS:"
550 LE=ABS(LE-10)*.5+ALE PRINT"0'S SCORE:HIGH SCORE IS:0'S HPS:"
600 IFS=HCTHEN500
610 PRINT"YOU HAVE THE NEW HIGH SCORE.WELL DONE!" GOTO4300 IFS=5
630 PRINT"THE NEW HIGH SCORE IS:"HPS-GOTO700
650 PRINT"YOU HAVE EQUALLED THE HIGH SCORE!" PRINT"WELL DONE!" GOTO700
700 PRINT"*****PRESS #10 TO FINISH GAME AND"
710 PRINT"*****PRESS ANYTHING ELSE FOR ANOTHER"
720 A=PEEK(127) IF A<4 THEN 20
730 IF A<4 THEN 10
740 PRINT"3",CHR$(0),POKE506,257 POKE190,0 END
1000 REM-INSTRUCTIONS
1010 PRINT"00" GOTO500
1020 PRINT"01"
1030 PRINT"02"
1040 PRINT"03"
1050 PRINT"FOR INTO THE FRENCH TRAP, AS POSSIBLE"
1060 PRINT"WITH YOUR CAR 0001 THE TRAP IS FORWARDED"
1070 PRINT"WITH BEACHS 0001 00 AND THERE ARE ALSO"
1080 PRINT"WHY OBSTACLES 0 0 0 TO AVOID"
1090 PRINT"00 YOUR CONTROLS ARE AS FOLLOWS --"
1100 PRINT
1110 PRINT"000 000 000"
1120 PRINT"01 THERE ARE 3 LEVELS OF PLAY AND THE"
1130 PRINT"HARDER THE LEVEL THE MORE OBSTACLES AND"
1140 PRINT"THE MORE SPEED!"
1150 PRINT"*****PRESS ANY KEY TO BEGIN"
1170 GETA:IF A=0 THEN 1170
1180 GOTO10
2000 REM-INITIALIZE ROUTINE AND MACHINE CODE DATA
2010 PRINT"*****"
2030 FORK=49152:GOTO253 KEHND:POKE,0 NEXT
2040 SY$A9152 CLR:SY$A9161
2045 FORK=49152:GOTO253 REM-NEXT
2050 FORK=1106:SEAN FORK=1106:REND:J NEXT G2=0
2060 FORK=12288+(800*1012288+1800)*7 G2=G2+1:POKE,0 NEXT NERTE
2070 FORK908,239 GOTO33
3000 DATA169,40,141,32,0,141,56,0,96,189,0,141,14,220,189,51,141,1,0,162,0,189
3010 DATA68,157,0,49,189,0,209,157,0,49,189,0,210,157,0,162,0,111,157,0
3020 DATA1,189,0,212,157,0,52,189,0,213,157,0,53,189,0,214,157,0,54,189,0,215
3030 DATA157,53,234,255,209,173,255,206,141,255,43,173,255,209,141
3040 DATA255,49,173,255,173,255,234,141,255,54,173,255,214,141,255,54,189,55
3050 DATA212,141,255,54,173,255,234,141,255,54,173,255,214,141,255,54,189,55
3060 DATA141,1,0,161,1,141,14,220,189,26,141,24,206,96
3070 REM-CHARACTER DATA
3080 DATA90,195,255,119,24,213,255,219,24
3090 DATA102,255,255,66,90,96,255,255
3100 DATA68,255,129,189,189,189,189,129,255
3110 DATA1,240,216,246,216,247,12,12,7
3120 DATA60,66,157,161,161,157,66,60
3130 DATA67,130,85,154,16,8,176,17,130
3999 REM-SOUND SUBROUTINES
4000 POKEVL,15 POKEV,32 POKEH,55 POKEHL,55 POKEVL,0 RETURN
4100 POKEVL,15 POKEV,32 POKEH,255 POKEHL,255 POKEVL,0 RETURN
4200 POKEV,3 POKEV,129 POKEH,3 POKEHL,0
4210 POKEV,15012STEP,0 POKEV,0 NEXT
4220 POKEV,129 POKEH,0 RETURN
4300 POKEV,3 POKEV,17 POKEH,45 POKEHL,55
4310 FORK=150STEP,1 POKEV,0 NEXT
4320 POKEV,16 RETURN
4500 REM-LEVEL OF PLAY CONVERSIONS
4510 IFL=5 THEN LE=1
4520 IFL=59 THEN LE=2
4530 IFL=6 THEN LE=3
4540 IFL=11 THEN LE=4
4550 IFL=16 THEN LE=5
4560 IFL=19 THEN LE=6
4570 IFL=24 THEN LE=7
4580 IFL=27 THEN LE=8
4590 IFL=32 THEN LE=9
4600 LE=ABS(LE-3)*.5+5
4605 LE=ABS(LE-10)
4610 RETURN

```

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Here are descriptions of just a few of the games:

HOUSEBREAK You enter a house at night in an attempt to rob it of money and any gold and silver items you can find. Your object is to clean out the house. In the dark you must avoid bumping into the furniture. After an interval of time an alarm will sound and a short while later the lights will be turned on. A vicious dog is then released and you have to use all your skill and cunning to avoid getting bitten as he chases you around the house. Any injuries caused by the dog will slow down your escape. The game is played in real time, has excellent graphics and is very exciting. A new house is generated each time the game is played.

CORRIDORS OF DOOM! A dungeons & dragons type game that is very addictive. You can never win this game by chance. A lot depends on discovering the secrets of just how you have to deal with each individual monster in the game. There is a liquid which will destroy the Werewolf — but which one? How can you tame the giant spider? Will you ever learn the secret of how to defeat the Blood Devil? All of the monsters have treasures for those who are both brave and wise enough to overcome them, but to escape alive you must first cross some very nasty pits. Play it again and again.

AMAZING 3D MAZES Wander through the giant 18x18x18 mazes collecting treasures, you know where they are, but how do you get to them? Extra points are awarded for finding the shortest routes. Don't get too frustrated by apparent dead ends.

3D NOUGHTS & CROSSES Played inside a 4x4x4 cube, this is a game for the intellectual. Great graphics. It plays a mean game and wins about nine out of every ten games it plays.

TOWERS OF HANOI You will welcome this classical puzzle which is a must for anyone with a computer. The problems difficulty depends on how many disks you use. It might only take you a few minutes with four disks, but with all nine it could take all day. Two variations of the game are included. There is a constant display of Hours : Mins : Secs, so that you know how well or how badly you are doing at any particular stage. If you find you cannot work the problem out! The computer will show you the shortest possible solution.

THE VAULT A high security vault in Oxford. (The game can be changed to centre around your own home town) has ten doors, each with its own five figure combination. The combination of the nine inner doors are known, but only the manager knows the combination of the outer door. Unfortunately the manager has got himself locked in the Vault. It is your job to get him out before all the Oxygen is used up. The computer will give you metaphorical clues to how near you are getting. The time switches which change the combination every so often can prove a problem. This is a case which really puts your powers of logic to the test.

POPULATION SIMULATION This is a game for two players, each becoming the leader of one of the planets 'Techno' & 'Primo'. It is a battle to survive. Each decade a player must decide various things in governing his planet, he must carefully balance production and technology against consumption and population. He can either negotiate with his opponent or declare war on him. How about sending out an exploration party in search of new wealth. Only the experienced last very long.

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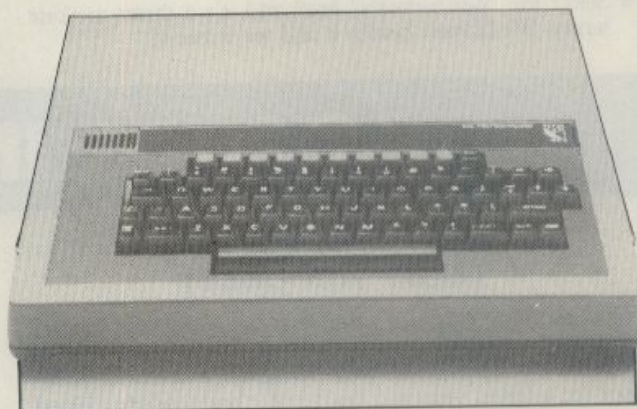
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Z-80 Disc Pack for the BBC Microcomputer £897.00

This unit connects to the BBC Micro in the same way as a normal disc drive, but as well as offering a dual 2 x 400K disc drive for use under BBC BASIC or other languages it provides the option of using the wide range of CP/M software available for business and data processing applications. The firmware supplied with the machine allows switching between BASIC and CPN, a powerful operating system developed from CP/M 2.2.

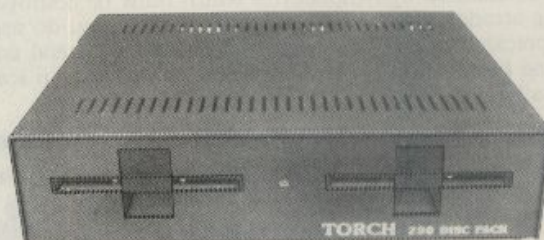
In addition to the disc pack a second processor is supplied. This is a Z-80A with its own 64K RAM card, communicating with the 6502A in the BBC computer through the 'Tube'. Typically the speed of execution of programs under the twin-processor system is increased by up to 50% compared with a conventional single-processor computer. A third processor, the 16 bit 68000, will shortly be available.

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A photograph of a vintage electronic calculator, likely a Casio FX-115V. It features a numeric keypad with 18 buttons arranged in three rows of six. The top row includes a power button, a square root button, and a reciprocal button. The middle row contains digits 0-9. The bottom row includes a decimal point, an equals sign, and a memory function button. To the right of the keypad is a small liquid crystal display (LCD) screen showing the number '1'. The calculator has a light-colored plastic casing.

“It really is about time you took your computing seriously.”

Address

YOUR LETTERS

This page is where you get the chance to put your opinions in print. Personal Computing Today welcomes letters from you on any aspect of microcomputing and views in general — as long as they're printable!

Please drop us a line to: The Editor, Personal Computing Today, 145 Charing Cross Road, London, WC2H 0EE.

Dear Sir,
Congratulations on producing a great magazine. I especially like your column on Add-Ons where you give a complete description on each peripheral, price and where it can be bought.

One criticism, however is that you do not print any information (e.g. price and where available) for your large Irish readership. I hope that you will take steps to rectify this situation or at least give it some serious thought.

Yours faithfully
Tony Power
Eire

Editor's reply: Thanks for the comments Tony. The reason we chose to give just the manufacturers address is that it is almost impossible to try and track down every supplier and the price of a product. By contacting the manufacturer you should be able to find out the address of your nearest supplier. Failing that they should be able to arrange to send you the goods.

Dear PCT

I wish to point out an omission in the logic for the TI-99/a program, "Blackjack", in your June issue. As the program stands, five-card tricks are treated as ordinary totals, when in fact they should be regarded as second only to 'Blackjack'.

So add the following lines to complete an otherwise excellent program.

2632 IF(CCT(4) >= 5) = -2	comment
THEN 2720	5 card tricks for bank
	+ player result — draw
2634 IF CCT(4) < 5 THEN	* CCT() = Card Count
2636	If bank < 5 cards, check
2635 IF TOTAL(4) = 0	player
THEN 2670 ELSE 2700	Pay player if bust
2626 IF CCT(T) >= 5	otherwise bank wins
THEN 2660	If card count >= 5 then
	player wins

*increment card count
3330 CCT(T) = CCT(T) + 1
3335 RETURN

*Reset
2875 LET CCT(RESET) = 0
Yours sincerely
Peter Shaw

P.S. Should you wish to distinguish between two five-card tricks, then edit line 2632 to read: "THEN 2640", to compare totals.

Dear PCT

I expect you receive hundreds of letters asking why you don't leave 'Micro Factfile' out of the magazine. Although I have a computer and do not read this part of the magazine I wish to support you on keeping this reference.

A few months ago a friend of mine was knocked down. His legs are paralysed and he is unable to go to school, so his mother and father are going to buy him a computer. Unfortunately they do not know which is the best at a reasonable price. The Micro Factfile supplies all this information which is now helping the boy. There must be many more children like this, so on behalf of these children keep the Micro Factfile!

Yours faithfully
Kevin Gardiner
Chepstow

P.S. May I make a suggestion. Many people are becoming interested in adventures. Why don't you keep a separate page for reviews on adventures and cut out some of the advertising.

P.P.S. I enjoy reading your magazine.

Editor's reply: You will be pleased to hear that we have no plans to drop the Factfile. It didn't appear last month because we ran a special feature on the top ten micros. As for the software reviews, we try and give a balanced view of the software that is available. This doesn't mean we will ignore adventure programs, they will be incorporated as and when we get them.

Dear Sir,

I would support John Ryden's letter praising Commodore. (May 1983). My VIC-20 developed a fault, preventing the use of a light pen. This was attended to by Commodore but I unfortunately had to return the VIC again because the fault persisted. Without any quibble the service section exchanged the VIC-20. Well done Commodore.

Yours faithfully
R Gardner
South London

Dear PCT

I was shocked and unhappy about the review on the Oric 1 you did in your March issue. Not only was it short but it didn't explain the full capabilities of what the computer can really do. I understand that the machine used was a pre-production Oric as stated in the article so of course some functions were incorrect.

e.g. the high resolution graphics. After reading it I felt it has been run down and not adequate but well worth it for its price. Also my view is that it offers more functions

than most micros have today. e.g. Prestel, double height characters, hi-fi output etc, so it is something special.

Yours faithfully
Adam Kirkpatrick
East London

P.S. When you are going to publish program listings for the Oric?

Editor's reply: I'm sorry you weren't entirely happy with the review of the Oric 1 computer. Unfortunately, due to Oric Products' much delayed delivery time our reviewer was forced to carry out his review over the Christmas period in order to meet publishing deadlines. The fact that the machine was a pre-production model didn't help matters. In a future issue of *Personal Computing Today* there will be a comparative review of the Oric 1 and the ZX Spectrum to give readers a much clearer idea of the machine's capabilities.

Dear PCT,

Please would you announce a new software house set up for the Oric 1 and it's users. The firm is called Mercury Software. We intend to produce full arcade quality games for the Oric 1 micro. Already we have a real time space invader selling at just £4.95, in full colour, sound and hi-res graphics. A copy of which will be forwarded for a full review by yourselves. We will soon be announcing Pacman and Digger also retailing at £4.95. Many thanks. Mercury Software is located in Manchester.

Yours faithfully
Paul Ralphs



Dear PCT

I must congratulate you on the production of THE best computer magazine. I receive every issue of it with great pleasure.

There are a number of people who are writing to you saying that the BBC Microcomputer is highly over-rated. Others are saying that it is no better than any other microcomputer. I must disagree with both "ideas" by STATING that the BBC Microcomputer is the fastest microcomputer in its price-range. It uses an MHz 6502 processor, the colour graphics are brilliant, the 4 channel sound generator is fantastic, and so are all the other main features. 32K RAM is not the BBC's full memory; 64K of RAM can be added on via a second processor (i.e. 6502 or Z80). As a matter of fact, people are underestimating the BBC's functions. It is impossible to compare something like a ZX81 with the might of a BBC Microcomputer.

I own a BBC model B with 32K of RAM. I'm not boasting, for with a BBC Microcomputer, I don't need to!

A number of my friends have ordered Sinclair machines. Sinclair have clearly stated on all adver-

tisements that you are to allow up to 28 days for delivery; one of my friends waited 3 months for his Spectrum only to find the "ZX SPECTRUM COLOUR & SOUND" didn't work at all.

M J Penning
S. Glamorgan

Dear Sir,

In response to W G Adams, having purchased a Commodore 64 in early February, I had not long to wait before I had a host of programs running on the machine. Thus, I thought I would provide a few addresses for any 64 owners who want high quality software.

1. Llamasoft Software
49, Mount Pleasant
Tadley
Hampshire RG26 6BN
2. Rabbit Software
380 Station Road
Harrow
Middlesex
3. Audiogenic Ltd
PO Box 88
Reading
Berkshire
4. Supersoft
Winchester House
Canning Road
Wealdstone
Harrow
Middlesex HA3 75J
5. Interceptor Micros
Lindon House
The Green
Tadley
Hampshire
6. Maplin Electronics
PO Box 3
Rayleigh
Essex
7. Adamsoft: telephone on weekdays or evenings
0706 524304.



Also, do not forget when Commodore launch the 64 software (already overdue) the amazing virtues of the 64 can be seen. I also agree with your idea of converting Pet 3000 and 4000 programs to run on the 64. This I have managed successfully with 'the Valley'. However, when will Simon's BASIC for the Commodore 64 be available? I have been informed that it is a very comprehensive extension to 64 BASIC. Can you help with a few comments, or is a review too much to ask for?

Yours faithfully
S Sethi

Editor's reply: Thank you very much for supplying that information, I am sure all 64 owners will appreciate it. As for your query about Simon's BASIC apparently it has been ready for some months now, but Commodore has still not decided whether to bring it out on cassette or disc. This seems to be the hold-up at present. When it does appear *Personal Computing Today* will carry a review of the new BASIC. So watch out for it on our pages.

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Rickmansworth Herts WD3 3AJ
Tel: 0923 779250

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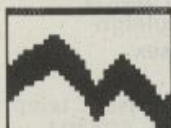
THE WITCHES DEFENCES

Stalagmites and stalactites - which grow
across your path.

Volcanoes - to get past alive - if you can!

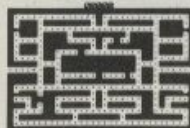
Vampire Bats - that cling to your ship and
make controls sluggish

Cave-ins - should you hit the side of the
cave with your Laser Cannon or Bomb, part
of the roof will cave in on you



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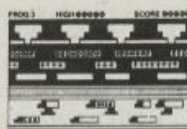
Stay alive as long as possible in open space
filled with flying rocks. Score by shooting
them - which also causes them to break into
lots of little bits and makes life even worse!

- Machine coded for fast action
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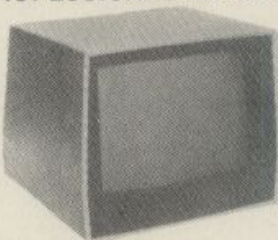
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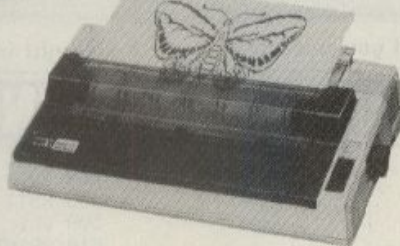
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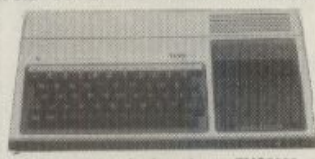
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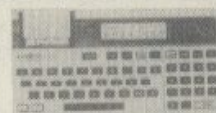
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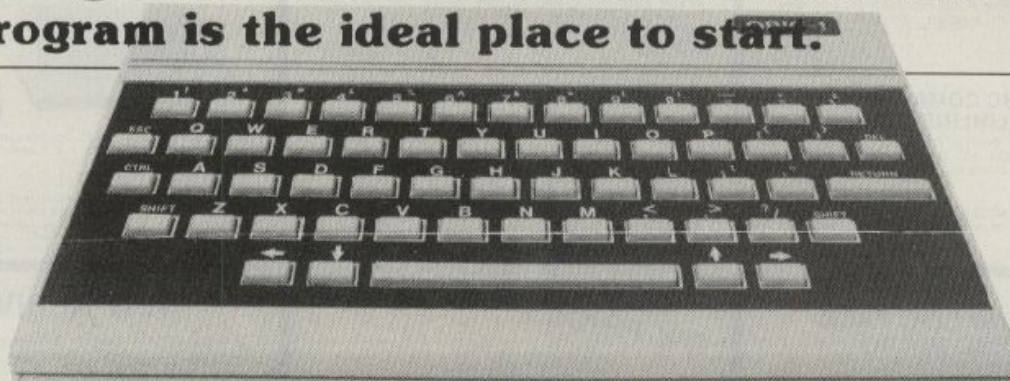
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ORIC DEMO

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PROGRAM LISTING

```

10 REM ORIC-DEMO
20 REM BY M.E. ORMEROD
30 CLS
40 PRINT
50 PRINT
60 PRINT"  HELLO WELCOME TO ORIC"
70 FOR G=48040 TO 48082 STEP 40
80 POKE G,17
90 NEXT G
100 FOR N=48082 TO 48122 STEP 40
110 POKE N,12
120 NEXT N
130 PRINT
140 PRINT
150 PRINT"  I WILL SHOW YOU WHAT I CAN DO"
160 WAIT 500
170 CLS
180 PRINT"  I CAN MAKE SOUNDS AT A SINGLE COMMAND"
190 PRINT"  YOU CAN TYPE: SHOOT,EXPLODE,ZAP,PING"
200 PRINT"  LET'S TRY THEM, ONE AT A TIME"
210 WAIT 500
220 CLS
230 POKE 48040,18
240 PRINT"EXPLODE"
250 WAIT 100
260 FOR T=1 TO 3
270 EXPLODE
280 WAIT 100
290 NEXT T
300 PRINT"SHOOT"
310 WAIT 100
320 POKE 48080,19
330 FOR N=1 TO 3
340 SHOOT
350 WAIT 100
360 NEXT N
370 PRINT"ZAP"
380 POKE 48120,20
390 FOR R=1 TO 3
400 ZAP
410 WAIT 100
420 NEXT R
430 PRINT"PING"
440 POKE 48160,21
450 FOR K=1 TO 3
460 PING
470 WAIT 100
480 NEXT K
490 WAIT 200
500 CLS
510 PRINT
520 PRINT
530 PRINT"  WATCH THIS FOR A FARTY TRICK"
540 WAIT 500
550 CLS
560 LORES 0
570 FOR D=48040 TO 49119
580 POKE D,INT(RND(1)*7+16)
590 NEXT D
600 PLOT 16,12,"NOT BAD EH!"
610 WAIT 500
620 CLS
630 PRINT
640 PRINT
650 PRINT"  HOW ABOUT THIS FOR AN ENCORE!"
660 WAIT 400
670 HIRES
680 FOR N=48960 TO 49709 STEP 40
690 POKE N,INT(RND(1)*7+16)
700 FOR W=0 TO 1100 STEP 40
710 SOUND 1,W/2,0
720 PLAY 1,0,5,5
730 NEXT W,N
740 PLAY 0,0,0,0
750 WAIT 400
760 CURSET 120,100,3
770 CIRCLE 50,1
780 WAIT 200
790 CURSET 90,70,3
800 DRAW 60,0,1
810 DRAW 0,60,1
820 DRAW -60,0,1
830 DRAW 0,-60,1
840 WAIT 300
850 CURSET 0,70,3
860 FILL 60,1,18
870 WAIT 500
880 LORES 0
890 PLOT 16,12,"THANK YOU-GOODBYE."
900 WAIT 300
910 EXPLODE
920 CLS
930 WAIT 1000
940 GOTO 30

```


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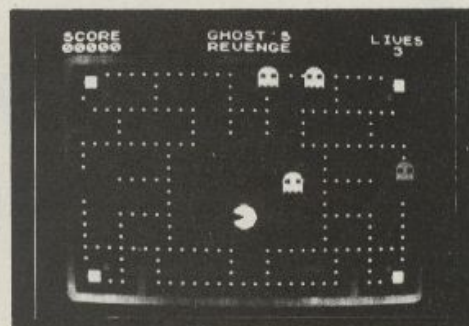
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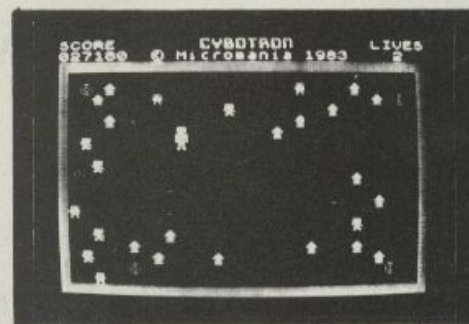
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KRAZEE KONG

Lucas Venter's program turns your Atari into an arcade machine.

The ugly gorilla, Kong has captured a beautiful young girl, and taken her to the top of a building. You, as the dashing hero, have to save her, jumping over the barrels Kong is tossing at you, and kill him. Krazee Kong is written for the Atari 400/800 with a minimum memory of 16K. The game is played with the joystick inserted in port 0, but can be rewritten for the

keyboard without too much trouble. On running Krazee Kong for the first time, the message, "KRAZEE KONG, PLEASE WAIT" will be displayed on the screen. After a while the question, "LEVEL?" will be displayed. Enter a number from one to nine. The game playground will be displayed. Upon pressing the START button, your little figure will appear in the

bottom left corner. Kong will immediately start tossing barrels and you will have to be ready. Pressing the red controller button for at least half a second, will make your figure jump. He will stay in the air for three seconds and then fall back to the earth. Jumping on top of a barrel will not register as a hit, but landing in one's way will. You score one point

for jumping over a barrel. On some parts the roof is lower. You will be unable to jump here. Push the joystick in the direction you want to move. You may only go upwards and downwards when below or above the ladder, (you are safe from barrels below the ladder.) When you have reached the solid wall next to Kong, be careful, because you are immediately transported to your starting position when Kong is killed, and that might just be in the way of an oncoming barrel. To be safe, only use the ladder going to Kong when there are no barrels



near the starting position.

Scoring is as follows: one point for jumping over a barrel and 100 for the destruction of Kong. An extra life is scored for every 300 points, and the score resets to zero when above 999. The game is fast for BASIC, because each character is not individually plotted but is a redefined character. This allows more colours and speeds up the program. Its only disadvantage is, that movement is restricted to one character at a time. As the game progresses, the barrels will begin moving faster until you get killed.

HOW IT RUNS

20-340	Character set redefinition.	660-855	Joystick movement routine.
350-465	Draws playfield and sets colours.	860-895	Get killed.
470-477	Main program loop. Extra life. Scoring.	900-930	Game over. Wait for the START button.
480-580	Barrel movement routine.	1000-1040	Kong killed. Add 100 points to score.
590-650	Kong's movement routine.		

Variables:

A, B and Q:	General use. (Sound, etc.)	K:	Kong's horizontal position.
ABAR(A):	Horizontal position of barrel A.	POS:	Character at Location X,Y
BBAR(A):	Vertical position of barrel B.	F:	Jumping flag.
PA(A):	Previous horizontal position of barrel A.	CT:	Duration of jump.
PB(A):	Previous vertical position of barrel A.	ART:	Time for changing RATE.
SCORE:	Score.	ST:	STICK(0)
LIVES:	Number of lives.	BT:	STRIG(0)
RATE:	Rate of barrel speed.	L:	LEVEL
X:	Horizontal position of man.	M1, M2:	Previous position of man before going up ladder.
Y:	Vertical position of man.	CHSET, CHORG:	Character set definition locations.

HINTS ON CONVERSION

Kraze Kong is written in Atari BASIC, which is quite similar to Microsoft BASIC. It isn't really suitable for computers without character set redefinition. It uses GRAPHICS 2 + 16, which gives the computer a screen resolution of 20 by 12 in 5 colours. The characters are twice their normal size. It ought to be convertible to computers like the VIC-20 and ZX Spectrum without too much modification. Just note that the PLOT, COLOR and DRAWTO

commands are different in this mode. COLOR is the ASCII code for the character to be plotted and PLOT x,y PRINTs the character at that location. It is similar to the Spectrum's PRINT AT command. The POKES at line 400 change the screen, border, background and character colours and can be achieved by the BBC computer by using the VDU19 command.

PROGRAM LISTING

```

20 DATA 60,62,60,60,40,40,8,62
30 DATA 56,56,16,56,84,16,40,68
40 DATA 60,60,195,189,189,189,153,255
50 DATA 60,60,60,60,60,36,36,102
60 DATA 0,0,0,60,60,60,24,255
70 DATA 189,189,189,189,189,36,36,102
80 DATA 0,126,90,126,126,24,0,24
90 DATA 126,129,189,161,161,189,129,126
100 DATA 0,0,0,0,126,159,159,126
110 DATA 255,255,153,102,102,153,255,255
120 DATA 255,129,255,129,255,129,255,129
130 DATA 255,255,255,255,255,255,255,255
140 DATA 255,0,234,170,235,0,255,255
150 DATA 0,0,41,237,237,255,255,255
200 DIM CHAR$(14)
210 CHAR$="!#,.&'@(<>)-=+"
215 GRAPHICS 2+16
220 POSITION 5,4: ? #6;"KRAZEE KONG"
230 POSITION 5,6: ? #6;"PLEASE WAIT"
250 CHSET=(PEEK(106)-8)*256:CHORG=57344
260 IF PEEK(CHSET+9)<>0 THEN 340
270 FOR I=0 TO 511:POKE CHSET+I,PEEK(CHORG+I):NEXT I
280 FOR I=1 TO 14
290 CHPOS=CHSET+(ASC(CHAR$(I))-32)*8
300 FOR J=0 TO 7
310 READ A:POKE CHPOS+J,A
320 NEXT J:NEXT I
330 FOR I=32 TO 46:POKE CHSET+I,255-PEEK(CHORG+I):NEXT I
340 POKE 756,CHSET/256

```


KRAZEE KONG

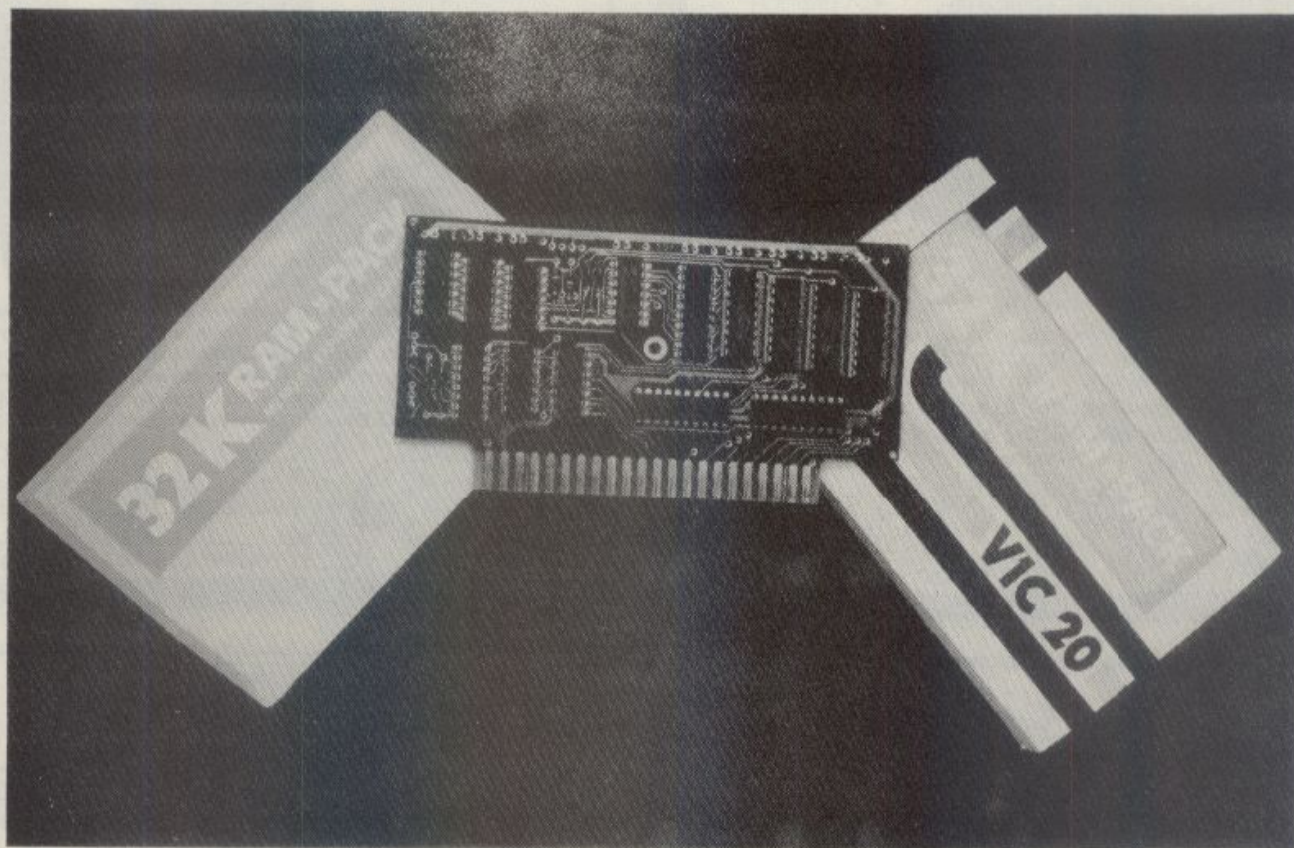
```

350 POSITION 5,4: ? #6;" ":POSITION 5,6: ? #6;"LEVEL?" :OPEN #1,4,0,
"K":GET #1,A:L=A-48:POSITION 5,6
360 COLOR 33+128:PLOT 1,1:COLOR 60+96:PL
OT 1,2:DRAWTO 12,2:COLOR 44:PLOT 6,0:COL
OR 46:PLOT 6,1
370 COLOR 60+96:PLOT 2,5:DRAWTO 13,5:PL
OT 1,8:DRAWTO 12,8:PLOT 1,11:DRAWTO 13,11
:COLOR 62+96:PLOT 13,2:DRAWTO 13,4
380 PLOT 1,5:DRAWTO 1,7:PLOT 13,10:DRAW
TO 13,8:COLOR 35+128:PLOT 1,10:POSITION 1
4,0: ? #6;"KRAZEE":POSITION 14,1
390 ? #6;"KONG":POSITION 14,3: ? #6;"luca
s":POSITION 14,4: ? #6;"venter":POSITION
5,6: ? #6," "
395 RESTORE 410
400 FOR A=708 TO 712:READ B:POKE A,B:NEX
T A
410 DATA 22,100,56,8,13
420 COLOR 43+128:PLOT 0,10:COLOR 61:PLOT
0,11:COLOR 45+96:PLOT 10,1:PLOT 10,0:CO
LOR 60+96:PLOT 1,3:DRAWTO 2,3
430 PLOT 5,6:PLOT 10,6:DRAWTO 11,6:PLOT
4,9:PLOT 6,9:PLOT 10,9
440 LIVES=3:SCORE=0:DIM ABAR(4),BBAR(4),
PA(4),PB(4):RATE=1:X=1:Y=10:K=6:PK=6
450 RESTORE 460:FOR A=0 TO 4:READ B,C:AB
AR(A)=B:BBAR(A)=C:PB(A)=0:PA(A)=0:NEXT A
460 DATA 10,4,6,4,3,7,8,7,8,10
465 IF PEEK(53279)<>6 THEN 465
470 POSITION 14,8: ? #6;"lives":POSITION
14,10: ? #6;"score":POSITION 14,11: ? #6
;SCORE:POSITION 14,9: ? #6;LIVES
472 IF F=1 THEN LOCATE X,Y+1,POS:IF POS=
41 THEN SCORE=SCORE+1
473 IF Y=1 THEN 1000
474 IF SCORE>299 AND QF=0 THEN QF=1:LIVE
S=LIVES+1
475 COLOR 35+128:PLOT X,Y
476 IF SCORE>599 AND QF=1 THEN QF=2:LIVE
S=LIVES+1
477 IF SCORE>999 AND QF=2 THEN QF=0:LIVE
S=3:SCORE=0
480 FOR A=0 TO 4:COLOR 41
481 IF ABAR(A)<0 THEN ABAR(A)=0
482 IF ABAR(A)>13 THEN ABAR(A)=13
483 PLOT ABAR(A),BBAR(A):COLOR 0:PLOT PA
(A),PB(A)
484 NEXT A
490 FOR A=0 TO 4
495 PA(A)=ABAR(A):PB(A)=BBAR(A)
500 IF BBAR(A)=4 AND ABAR(A)>1 THEN ABAR
(A)=ABAR(A)-RATE:GOTO 560
510 IF BBAR(A)=4 AND ABAR(A)<2 THEN BBAR
(A)=7:ABAR(A)=2:GOTO 560
520 IF BBAR(A)=7 AND ABAR(A)<13 THEN ABA
R(A)=ABAR(A)+RATE:GOTO 560
530 IF BBAR(A)=7 AND ABAR(A)>12 THEN ABA
R(A)=12:BBAR(A)=10:GOTO 560
540 IF BBAR(A)=10 AND ABAR(A)>0 THEN ABA
R(A)=ABAR(A)-RATE:GOTO 560
550 IF BBAR(A)=10 AND ABAR(A)<1 THEN 580
560 NEXT A
570 SOUND 0,255,10,10:FOR Q=1 TO 2:NEXT
Q:SOUND 0,0,0,0:GOTO 660
580 SOUND 0,120,0,8
590 COLOR 0:PLOT K,0:PLOT K,1
600 B=SGN(X-K):K=K+1
610 IF K<2 THEN K=K+1
620 IF K>9 THEN K=K-1
630 COLOR 38:PLOT K,0:COLOR 39:PLOT K,1:
ABAR(A)=K:BBAR(A)=4:FOR Q=1 TO 7:NEXT Q
635 COLOR 44:PLOT K,0:COLOR 46:PLOT K,1:
SOUND 0,0,0,0
640 COLOR 43+128:PLOT 0,10
650 GOTO 560
660 ST=STICK(0):LOCATE X,Y,POS:BT=STRIK
E(0):LOCATE X,Y-1,BPOS
665 IF POS=41 THEN 860
666 IF F=1 THEN 680
670 IF ST=15 AND BT=1 THEN 470
680 IF ST<>15 AND F=0 THEN 750
690 IF F=1 THEN CT=CT+1
700 IF CT=2 THEN COLOR 0:PLOT X,Y:F=0:CT
=0:Y=Y+1:GOTO 470
710 IF F=1 THEN 470
720 IF BPOS=60+96 OR BPOS=62+96 THEN 470
730 F=1:CT=0:Y=Y-1:ART=ART+L:IF (ART/30)
=INT(ART/30) THEN RATE=RATE+1
740 GOTO 470
750 COLOR 0:PLOT X,Y
760 IF ST=7 THEN X=X+1:LOCATE X,Y,POS:IF
X>13 THEN X=X-1:GOTO 470
763 IF ST=7 AND POS=62+96 THEN M1=X:M2=Y
765 IF ST=7 THEN 470
770 IF ST=11 THEN X=X-1:LOCATE X,Y,POS:I
F X<1 THEN X=X+1:GOTO 470
780 IF ST=11 AND POS=62+96 THEN M1=X:M2=
Y
790 IF ST=11 THEN 470
800 IF ST=14 THEN LOCATE X,Y-1,POS:IF PO
S<>62+96 THEN 470
810 IF ST=14 THEN Y=Y-3:COLOR 62+96:PLOT
M1,M2:GOTO 470
820 IF ST=13 THEN LOCATE X,Y+3,POS:IF PO
S<>62+96 THEN 470
830 IF ST=13 THEN Y=Y+3:IF Y+3=7 THEN X=
12:GOTO 470
840 IF ST=13 THEN IF Y+3=4 THEN X=2:GOTO
470
850 IF ST=13 THEN IF Y+3=1 THEN X=12:GOT
O 470
855 GOTO 470
860 LIVES=LIVES-1:RATE=1
870 COLOR 64:PLOT X,Y
880 FOR Q=1 TO 255:POKE 712,PEEK(53770):
SOUND 0,0,10,10:NEXT Q:POKE 712,13
890 SOUND 0,0,0,0
895 IF LIVES<>0 THEN 470
900 GRAPHICS 2+16
910 POSITION 8,4: ? #6;"GAME":POSITION 8,
6: ? #6;"OVER":POSITION 0,0: ? #6;"SCORE:"
;SCORE
920 IF PEEK(53279)<>6 THEN 920
930 RUN
1000 SCORE=SCORE+100
1010 COLOR 0:PLOT K,1:PLOT K,0:COLOR 64:
PLOT K,1:COLOR 35+128:PLOT 11,1
1020 FOR Q=0 TO 255
1030 SOUND 0,0,10,10:POKE 712,PEEK(53770
):NEXT Q:POKE 712,13:SOUND 0,0,0,0
1035 POKE 708,20:COLOR 0:PLOT 11,1:POKE
710,56
1040 X=1:Y=10:COLOR 35:PLOT X,Y:COLOR 44
:PLOT K,0:COLOR 46:PLOT K,1:GOTO 470

```


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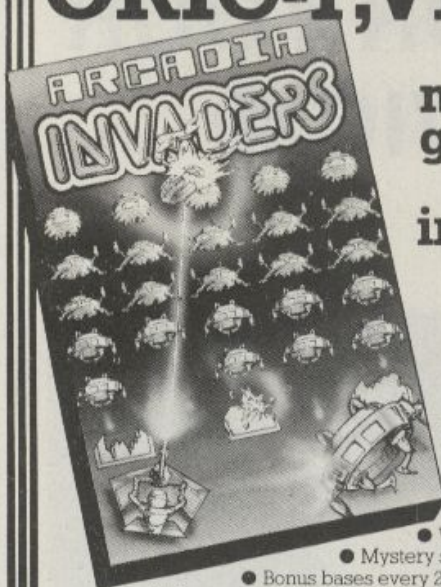
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THE CITADEL



Program your VIC 20 to run this mammoth adventure game from M. B. Dhun.

The Kingdom of Juliana has been over-run by a horde of brigands. They have made the Citadel their stronghold and from time to time marauding bands roam the Kingdom just spoiling for a fight.

The exiled King has called upon his brother, the ruler of neighbouring Katiera and as a result you have been dispatched to restore the kingdom by defeating the brigands in the Citadel.

The Kingdom consists of eight open plains and the Citadel itself. Your quest starts on an open plain with the Citadel due South of you, but before you can gain entry to the Citadel you must first find the 3 keys to unlock a secret door.

You start with 10 warriors, 30 bags of gold and 25 bags of rations. At the end of each of your moves your rations will decrease in relation to the number of warriors you have. If you run out of rations then some warriors are bound to die of starvation.

Gold is a useful commodity,

as you can buy warriors and rations at the Bazaar. Each warrior can only carry a maximum of 6 bags of gold and you will lose any excess gold that you have.

The Bazaar owner is a cantankerous soul and is selective in what he offers for sale at each visit, he may even close the Bazaar if he feels like it. Other goods which may be purchased, when on offer, are a Mule, which can carry 50 bags of gold, a Guide who will prevent you from getting lost in uncharted territories and a Healer, who can cure the plague that falls from time to time.

On the Plains

On the open plains you can suddenly become lost, the plague can fall, you may be cursed by a Wizard or a Dragon may attack. In all these eventualities your warriors, gold or rations could be depleted, unless you have a Guide, Healer, Warlock or Magic Sword,

which guard against these happenings and also reap benefits of extra warriors, rations or gold.

Bands of Brigands may attack you on the plains or even when you enter the Tomb or the Ruin. Useful items can be found in the buildings, even if they were empty on a previous visit (Brigands tend to move things around) and are also awarded as 'booty' when you defeat a band of brigands. You may fight or retreat when the brigands attack, but you will lose warriors in a retreat.

When you have found the 3 keys your troubles are not over. You must regain the Citadel and use the keys in the correct order to gain admittance. Once inside the remaining Brigands will attack and have to be defeated.

Keep an eye on your Inventory, which is produced at the start of each move. If you run out of warriors or you are unable to pay for goods purchased then you have failed.



Variables Used

W, G, R	Running totals of your Warriors, Gold and Rations
DW, DG	Gold and Warriors in possession of the Dragon
X	Your geographical location
WW	Warlock
HH	Healer
GG	Guide
MM	Mule
SS	Magic Sword
K	Number of keys found
YY	Counter used towards your score

T,U,J,L	General purpose variables
P	Your warrior loss in a battle
Q	Brigands loss in a battle
QQ	Used to indicate a battle inside the Citadel
ZZ	Ensures that the key sequence does not change during a game
E	Counter used in key sequence
O\$	Key Sequence
Z\$	Your move

Other string variables are used to query whether you will enter a building, fight and other decisions.

GUIDE TO UPPER CASE AND Lower case LETTERS

abcdefghijklmnopqrstuvwxyz
 ! " # \$ % & ' () * + , - . : ;
 @ [\] ^ _ ` { | } ~ ? , . : ;

HOW IT RUNS

2-9	Set variables and clear screen
90-96	Inventory printed at the beginning of each move
100-106	Controls your move
120-127	Rations depleted at end of each move
128	Warriors starve if no rations left
140-153	Sanctuary routine
160-265	Bazaar routine
164	Decides what is on offer and the price
174-188	Rations for sale
192-202	Warriors for sale
204-214	Haggle over the price
216-228	Mule for sale
238-245	Guide for sale
258-265	Healer for sale
280-301	Decides what happens on the open plains
302-305	Uncharted Territory routine
308-311	Plague routine
313-316	Warlocks Curse routine
318-324	Dragon Attacking routine
325-347	Brigands Attacking routine
360	Quest completed
362-371	Decides what rewards are gained
372-374	Awards Magic Sword
376-378	Awards Warlock
380-382	Awards Keys
384	Awards Warriors
390-394	Awards Gold
400-422	Tomb and Ruin routine
432-460	Key sequence
700-710	Checks for valid moves
900-924	Calculates your new position
920-924	Inventory update routine from Bazaar
1000-1050	Prints your score and restarts game when you are ready

HINTS ON CONVERSION

This game has been restricted in view of the memory it utilises to ensure that it fits and runs in a standard VIC with 3K expansion. For machines with larger expansions then sound effects can easily be added. e.g. Doors opening when entering buildings, or running feet when the Brigands attack.

The symbols at the commencement of PRINT statements are to set colour. Statements are in blue, Awards in green, Forfeits in red, etc.

There are only 2 POKES in the program so conversion to other machines is easy. In addition to keeping an eye on their line length to prevent the breaking up of words then these 2 pokes are all that need be changed and they are not integral to the program.
 POKE 36879,25 - sets screen and background to white
 POKE 36869,242 - sets to Upper/Lower case

PROGRAM LISTING

```

READY.
2 POKE36879,25:W=10:G=30:R=25:Y#=" YOU HAVE FAILED IN YOUR QUEST"
3 I#="BUYING V/?":J#=" YOU ARE ON A PLAIN"
4 DW=2:DG=4
7 POKE36869,242
8 X=2
9 PRINT"J"
90 PRINT"X/X?/IF I":PRINT"OARRIORS"R:IFW=1THENPRINT"J","OARLOCK"
91 PRINT"ATIONS"R:IFHH=1THENPRINT"J","EALER"
92 PRINT"OLD"K:IFGG=1THENPRINT"J","UIDE"
93 PRINT"EYS"K:IFMM=1THENPRINT"J","ULE"
94 IFSS=1THENPRINT"AGIC WORD"
96 PRINT
100 PRINT"WHICH WAY?"
101 IFX=2THENPRINT"HE ITADEL IS DUE SOUTH"
102 GETZ#:IFZ#=""THEN102
103 GOTO700
104 PRINTJ#
106 GOTO900
120 IFW<0THENR=R-1
121 IFW>15THENR=R-1
122 IFW>30THENR=R-1
123 IFW>45THENR=R-1
124 IFW>60THENR=R-1
125 IFW>75THENR=R-1
126 IFW>90THENR=R-1
127 IFR<0THENR=0
128 IFR<1THENW=W-2:PRINT"UT OF AIONS":PRINT"2 OARRIORS STARVE"
130 IFR<1THENPRINT"O OARRIORS LEFT":PRINTY#:GOTO1000
131 YY=YY+25
132 PRINT:GOTO90
140 PRINT"HERE IS A ANCTUARY":PRINT"O IN V/?"
141 GETK#:IFK#=""THEN141
142 IFK#="N"THEN280
143 IFK#="Y"THENI=INT(RND(1)*4)+4:GOTO145
144 GOTO141
145 PRINT"LECRUIT"t+2"OARRIORS":PRINT"ATHER"t+1"ATIONS":PRINT"IVEN"t"AGS O
F OLD"
146 W=W+t+2:IFW>99THENW=99
147 R=R+t+1:IFR>99THENR=99
148 G=G+t:IFG>W*6+MM*50THENG=W*6+MM*50
152 IFK=3THENPRINT"URTHER LECRUITS":W=W*2:IFW>99THENW=99
153 GOTO120
160 PRINT"HERE IS A AZAAR":PRINT"O IN V/?"
161 GETX#:IFX#=""THEN161
162 IFX#="N"THEN280
163 IFX#<>"Y"THEN161
164 T=INT(RND(1)*5)+1:U=INT(RND(1)*3)+1:J=INT(RND(1)*5)+6
165 ONT GOTO174,192,216,238,258
174 PRINT"OR SALE AIONS":PRINTU"AGS OF OLD PER UNIT":PRINTI#
175 GETA#
176 IFA#="N"THEN120
177 IFA#<>"Y"THEN175
182 PRINTU"AGS OF OLD EACH":PRINT"OW MANY":INPUTPP
184 G=G-U*PP:R=R+PP:GOTO187
186 G=G-J*U
187 IFG<0THENPRINT"IAZAAR OWNER KILLS YOU FOR NOT BEING ABLE TO PAY":PRINTY#:G
OTO1000
188 GOTO920
192 PRINT"OR SALE UOARRIORS":PRINTJ"AGS OF OLD":PRINTI#
194 GETB#
195 IFB#="N"THEN120
196 IFB#<>"Y"THEN194
202 PRINT"HAT WILL BE"J*U"AGS"
204 PRINT"AGREE THE PRICE V/?"
206 GETC#
207 IFC#="Y"THEN186
208 IFC#<>"N"THEN206
210 L=INT(RND(1)*2)+1
212 IFL=1THENPRINT"IAZAAR LOSED":GOTO120
213 J=J-1:IFJ<1THENL=1:GOTO212
214 PRINT" THEN"J*U"AGS":GOTO204
216 IFMM=1THENL=1:GOTO212
218 PRINT"OR SALE ULE"J"AGS":PRINT"AN CARRY 50 AGS OF OLD":PRINTI#
224 GETD#
225 IFD#="N"THEN120

```


PROGRAM LISTING

```

226 IFD$<"Y" THEN 224
228 U=1:GOTO204
238 IFG=1 THEN L=1:GOTO212
240 PRINT "FOR SALE (UIDE" J" JAGS OF GOLD. /EVER GET  LOST":PRINT I#
242 GET E#
243 IF E#="N" THEN 120
244 IF E#<"Y" THEN 242
245 U=1:GOTO204
258 IFH=1 THEN L=1:GOTO212
260 PRINT "FOR SALE (EALER" J" JAGS OF OLD. /EVER FALL  ILL":PRINT I#
262 GET F#
263 IF F#="N" THEN 120
264 IF F#<"Y" THEN 262
265 U=1:GOTO204
280 J=INT(RND(1)*12)+1
282 IF J=1 THEN 302
284 IF J=3 THEN 308
286 IF J=5 THEN 318
288 IF J=7 THEN 313
290 IF J=9 THEN 325
291 PRINT "ALL CLEAR. /O DANGER"
300 REM
301 GOTO 120
302 PRINT "NCHARTED (ERRITORY"
303 IFG=1 THEN PRINT "DU HAVE A (UIDE":PRINT "AIN 2 OARRIORS":W=W+2:IFW>99 THEN W=
99
304 IFG=1 THEN 120
305 PRINT "O (UIDE":PRINT "LOSE 2 OARRIORS":W=W-2:GOTO 120
308 PRINT "LAGUE AREA"
309 IFH=1 THEN PRINT "DU HAVE A (EALER":PRINT "AIN 2 OARRIORS":W=W+2:IFW>99 THEN
W=99:GOTO 120
310 IFH=1 THEN 120
311 PRINT "O (EALER. 2 OARRIORS DIE":W=W-2:GOTO 120
313 PRINT "HIS AREA -URSED"
314 IFW=1 THEN PRINT "DU HAVE A OARLOCK  CURSE FAILS. (AIN 2  OARRIORS":W=W
+2:IFW>99 THEN W=99
315 IFW=1 THEN 120
316 PRINT "O OARLOCK. LOSE 1/4  OF OLD":G=3*G/4:G=INT(G):GOTO 120
318 PRINT "RAGON ATTACKS"
319 IFSS=1 THEN PRINT "DU HAVE THE *WORD  SLAY -RAGON":PRINT "-APTURE" DW" OARRIO
RS AND" DG
320 IFSS=1 THEN PRINT "JAGS OF OLD"
321 IFSS=1 THEN G=G+DG:W=W+DW:DW=4:DG=2:IFW>99 THEN W=99:IFG>W*6+MM*50 THEN G=W*6+MM*
50
322 IFSS=1 THEN PRINT "LOSE SWORD":SS=0:GOTO 120
323 PRINT "O *WORD. LOSE 1/4 OF OLD AND OARRIORS":DG=DG+G/4:DW=DW+W/4:DG=INT(
DG)
324 DW=INT(DW):G=3*G/4:G=INT(G):W=3*W/4:W=INT(W):GOTO 120
325 J=INT(RND(1)*W)+INT(RND(1)*W)+1
326 PRINT "J" (RIGANDS ATTACK":PRINT "DU HAVE" W" OARRIORS":PRINT "-IGHT OR (ETREA
T  _/_?"
327 GET G#
328 IFG#="R" THEN W=W-2:PRINT "LOSE 2 OARRIORS IN THE RETREAT":GOTO 120
329 IFG#="F" THEN 336
330 GOTO 327
336 P=INT(RND(1)*6)+1:Q=INT(RND(1)*7)+3
338 W=W-P:J=J-Q
340 IFW<1 THEN 130
342 IFJ<1 THEN PRINT "LOSE" P" WARRIORS IN THE BATTLE":GOTO 360
343 PRINT "LOSE" P" WARRIORS IN THE BATTLE":PRINT "BRIGANDS DEAD"
344 PRINT "KIRMISH OVER"
345 IFW-J>3 AND W<20 THEN PRINT "WELL DONE. CAPTURE" J" MEN"
346 IFW-J>3 AND W<20 THEN PRINT "HEY WILL FIGHT WITH  YOU":W=W+J:GOTO 360
347 GOTO 326
360 IFK=3 AND O=1 THEN PRINT "WELL DONE":PRINT "QUEST COMPLETED":GOTO 1000
362 J=INT(RND(1)*8)+1
364 IFJ=1 OR J=3 THEN 372
366 IFJ=2 OR J=7 THEN 376
368 IFJ=4 OR J=5 THEN 380
370 IFJ=6 OR J=8 THEN 384
371 GOTO 390
372 IFSS=1 THEN 390
374 SS=1:PRINT "LEWARD - AGIC *WORD  PILLS -RAGONS":GOTO 390
376 IFW=1 THEN 390
378 WW=1:PRINT "LEWARD - OARLOCK":PRINT "ROTECTS FROM CURSE":GOTO 390

```


THE CITADEL

PROGRAM LISTING

```

380 IFK=3THEN390
382 K=K+1:PRINT"DO YOU HAVE NOW FOUND"K" KEYS":GOTO390
384 PRINT"MAIN 2 RECRUITS":W=W+2:IFW>99THENW=99
390 J=INT(RND(1)*10)+1
392 IFJ=5THENPRINT"OLD FOUND":GOTO120
394 G=G+4:PRINT"IND 4 BAGS OF GOLD":GOTO120
400 PRINT"HERE IS A LOMB":PRINT"IO IN V/"
401 GETU$
402 IFU$="N"THEN280
403 IFU$<>"Y"THEN401
404 GOTO410
405 PRINT"HERE IS A RUIN":PRINT"IO IN V/?"
406 GETV$
407 IFV$="N"THEN280
408 IFV$<>"Y"THEN406
410 J=INT(RND(1)*3)+1
420 IFJ=2THEN325
422 GOTO362
432 PRINT"-ITADEL. SE THE KEYS IN THE CORRECT ORDER"
433 IFZZ=1THEN442
434 J=INT(RND(1)*6)+1:ZZ=1
436 IFJ=1THEN0$="BSG"
437 IFJ=2THEN0$="BGS"
438 IFJ=3THEN0$="GSB"
439 IFJ=4THEN0$="GBS"
440 IFJ=5THEN0$="SBS"
441 IFJ=6THEN0$="SGB"
442 E=1
443 PRINT"THE KEYS ARE OLD. SILVER AND IRASS."
444 PRINT"WHICH KEY - I, * OR I":INPUTH$
446 IFH$=MID$(0$,E,(1))THENE=E+1:GOTO450
448 PRINT"GO _/I":PRINT"YOU ARE BACK ON THE PLAIN. THE CITADEL IS DUE SOUTH":
X=2:GOTO120
450 JFE>3THEN00=1:GOTO325
460 PRINT"WRONG":GOTO444
700 IFX=1ANDZ$<>"N"THEN710
701 IFX=3ANDZ$<>"W"THEN710
702 IFX=4ANDZ$<>"W"THEN710
703 IFX=7ANDZ$<>"S"THEN710
704 IFX=9ANDZ$<>"E"THEN710
705 IFX=8ANDZ$="S"THEN710
706 IFX=6ANDZ$="W"THEN710
707 IFX=5ANDZ$="N"THEN710
708 IFX=2ANDZ$="S"ANDK<>3THENPRINT"DO YOU NEED 3 KEYS TO ENTER THE -ITADEL":GO
TOTO100
709 GOTO104
710 PRINT"CAN'T GO THAT WAY":GOTO100
900 IFX=2ANDZ$="N"THENX=5:GOTO917
901 IFX=2ANDZ$="S"THENX=1:GOTO917
902 IFX=2ANDZ$="E"THENX=3:GOTO917
903 IFX=2ANDZ$="W"THENX=8:GOTO917
904 IFX=3THENX=2:GOTO917
905 IFX=4THENX=5:GOTO917
906 IFX=5ANDZ$="E"THENX=4:GOTO917
907 IFX=5ANDZ$="W"THENX=6:GOTO917
908 IFX=5ANDZ$="S"THENX=2:GOTO917
909 IFX=6ANDZ$="N"THENX=7:GOTO917
910 IFX=6ANDZ$="S"THENX=8:GOTO917
911 IFX=6ANDZ$="E"THENX=5:GOTO917
912 IFX=7THENX=6:GOTO917
913 IFX=8ANDZ$="N"THENX=6:GOTO917
914 IFX=8ANDZ$="E"THENX=2:GOTO917
915 IFX=8ANDZ$="W"THENX=9:GOTO917
916 IFX=9THENX=8
917 ONXGOTO432,280,160,400,280,280,140,280,405
920 IFT=2THENW=W+U
921 IFT=3THENMM=1
922 IFT=4THENGG=1
923 IFT=5THENHH=1
924 GOTO120
1000 PRINT:PRINT"OUR SCORE IS"
1010 SC=YY+50*(GG+HH+WW+SS+MM)+1000*K+1500*E+50*(G+R+W)
1020 PRINT:PRINTSC
1030 PRINT:PRINT"IT ANY KEY"
1040 GETZZ$:IFZZ$=""THEN1040
1050 CLR:GOTO2

```


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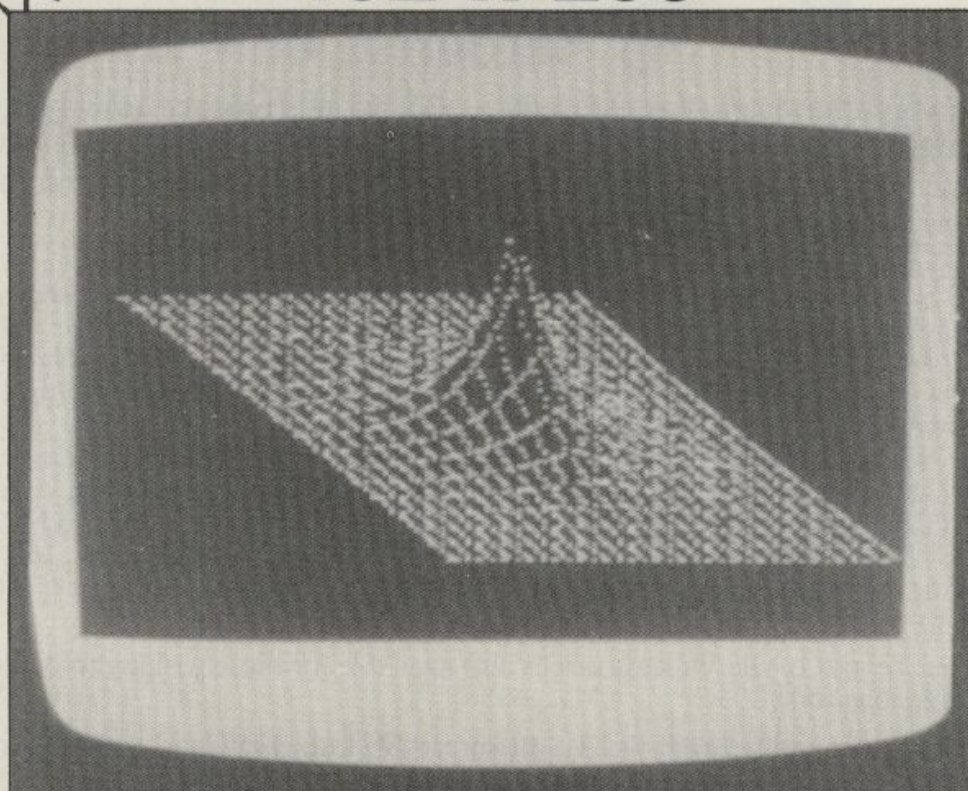
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TECHNICAL ENQUIRIES

MICROANSWERS is Personal Computing Today's Technical Enquiries Service. Each month we will endeavour to answer your questions on the subject of micro-computing. We would love to hear of your problems (honest!) as it is certain that if you are having trouble then other users of your machine will also be suffering.

So here's your chance to lighten your burden by sharing your troubles with Personal Computing Today's panel of experts.

Address your letters to:

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Dear PCT

I would be very grateful if you could help me with the following problems.

I own a VIC 20, not expanded. When I use it for about two hours I find that there's a black (sometimes white) cursor on the screen in memory location 7872. It appears in the same position every time. At first I thought it because of the mono TV, but after I had tried it on a colour TV the same thing happened.

The cursor doesn't blink, its like a rectangle on the screen. It disappears when I either clear the screen or when something touches it (for instance, during the course of a game), but it appears again after a few seconds.

Could you please tell me what's wrong with it. Is there anything wrong with the VIC. I hope not because I only bought it from Boots before Christmas!

I have a problem when I use the GET statement e.g. Hit F1 to play. When I pressed the RUN-STOP button it says: Break in (Line Number).

Is there a statement I could add on to the program so it would ignore the RUN-STOP and only run when F1 is pressed.

Finally, I am thinking of buying a Super Expander cartridge for its high resolution graphics but it only contains an extra 3K of memory. I would also like to buy a 16K RAM pack. Is there a cartridge available which has both the things I need. I can't afford a memory expansion board yet.

Thank you for your help.

Yours faithfully,

S.Y. Low

Greater Manchester

Your VIC sounds like it is suffering from an overheating problem. The likeliest cause of this particular effect is that one bit, of one byte of the RAM which supplies memory to the screen is adopting a 'high' state when a certain temperature is reached. To repair this it is only a case of replacing the RAM chip which contains the video memory. Unfortunately this job should only be carried out by a qualified service engineer and should not be attempted by yourself. Take the computer back to the store where you bought it and they will be able to get it serviced.

There is nothing unusual about the action of the RUN/STOP key, that is what it is there for. As for disabling it, I couldn't find a POKE or a routine to do this. So if anyone out there knows

of a way to disable the VIC's RUN/STOP key, drop us a line at Micro Answers and we will print it.

In answer to your final question I think you would do well to check out the Stack range of memory expansions and ROM based toolkits. This range will enable you to put together a 16K unit which includes a high resolution capability.

Dear PCT

Can you help me? In your 1982 December issue you had a program for the VIC 20. After programming it in I found out it needed the 3K expander. So I just left it. Now I have purchased a 3K expander. I then programmed it in checking every line as I went. When I finally reached the end I ran it, it said SYNTAX ERROR in 930. I checked this line, it was correct. So I checked all the program again. It was correct. Line 930 is listed below:

```
930 P(A) = CP:M(A) = CM:0(A) = FS:POKE CP8
CS:NEXT A
```

Could you please tell me what is going wrong.

J. Rogers

Sorry, our fault this one. When the program was typeset an O in that line got changed to a 0 (zero). So in fact the third statement in that line should read `O(A) = FS`, and not `0(A) = FS`. The reason that this caused the syntax error is that the VIC (or any other computer that I know of) will not allow you to start a variable name with a numeric. It is alright to suffix the variable name with a number, for instance `A3`, `B9`. Sorry again for the mistake and I hope you will now be able to complete what is a fun program.

Dear PCT

Being a newcomer to the computing 'bug', I would like to ask a couple of questions.

As Atari computers have been modified to run on our voltage and frequency, does any modification have to be carried out on the software as well?

Bearing in mind that I would like to buy a computer to get to grips with programming, playing games and some business applications, which would be better — an Atari 400 + BASIC or the Lynx?

Yours faithfully

A. Malden

Bury St. Edmunds

Atari computers are in fact manufactured for use in England and do not need any modification. As far as a piece of software is concerned there is no difference between an English and an American Atari. All English Atari's are equipped with an uprated graphics chip known as the GTIA. This offers the programmer an extra three graphics modes. As far as I am aware there is no commercially available software which makes use of this chip's facilities. To conclude, you should have no problem getting American software to run on your Atari computer, provided of course that you have the correct amount of memory.

With respect to your second query, we try not to give advice in Micro Answers about which machines to buy, so please, no more letters asking us to make your decision for you. However what we can do is highlight certain aspects of machine in the hope of making your decision easier.

With a view to playing games, there are few machines available which can surpass the Atari for choice and quality of games software. Atari's expertise in producing games machines has made their computers the easiest to use in both roles.

Choosing a computer for programming is more difficult. Two points you should consider are whether the machine you choose will let you fully explore the art of programming by having either a comprehensive BASIC built in or the facilities to extend the BASIC or even move on to a higher language. Secondly, if you are a raw beginner you should check the manual to see whether you can understand it and if not find out if there are any books available which will provide for the points which the manual doesn't.

Dear PCT

I recently salvaged an old 8-bit Telex-coded teleprinter in good condition and would like to interface it to a BBC 'B' with the intention of using it for letter quality printing (it has individual hammers). Whilst this idea may sound a little eccentric I would say that I am serious about this project and am prepared to put in a good deal of work. In fact, I will have to clean and restore the machine to working order first!

Therefore, I wonder if you could help me in a number of ways. I would say I have a reasonable grasp of basic principles on the BBC Micro, and accept that much assembly language programming will have to be learnt, so could you recommend a book or books which would assist me in the area of printer interfacing from scratch.

Secondly is there a source of information on the operating principles of such Telex printers that are available. Lastly, the machine is called 'FRIDEN' and I wonder if it would be possible to find out more about the particular machine system and its uses or limitations. I have tried to find a company and failed.

I realise this may be a tall order but any information you could give me would be gratefully received.

Your faithfully,
Michael Kidd
London

Not such a tall order this one. It just so happens that Personal Computing Today's sister magazine, Computing Today, ran a two-part article on using teleprinters with computers. The articles appeared in the December 1982 and the January 1983 issues of Computing Today.

The articles give details on how the teleprinters work, how to interface them and how to write the software to drive them. There is only one problem, both the articles are based around the NASCOM microcomputer. Not to worry, they contain a lot of essential information about teleprinters and should tell you virtually all you need to know about starting your own project on the BBC.

A useful book to buy to help with the conversion onto the BBC is 'The BBC Micro - an expert guide'. This book has been written by Mike James and is published by Granada, costing £6.95. The book covers advanced aspects of the BBC and includes chapters on interfacing and assembly language programming.

PROGRAM CORRECTIONS

In last month's issue we noticed that a few characters had crip off of the Atari Silver Surfer program. Here are the corrections you need to make in order to get the program running.

Lines 60-97: POKE N+D+ should be changed to POKE M+N+

Lines 140, 170, 200: These should read FOR N=1 TO 10

Line 280: The start of this line should read IF MAN < 400

Line 5010: The star of this line should read IF D=7 AND MAN < 400

Line 5020: The start of this line should read IF D=11 AND MAN > 0

Lines 6010 & 7010: These should start PRINT #6

PRIORITY REPLY

August 1983 Issue

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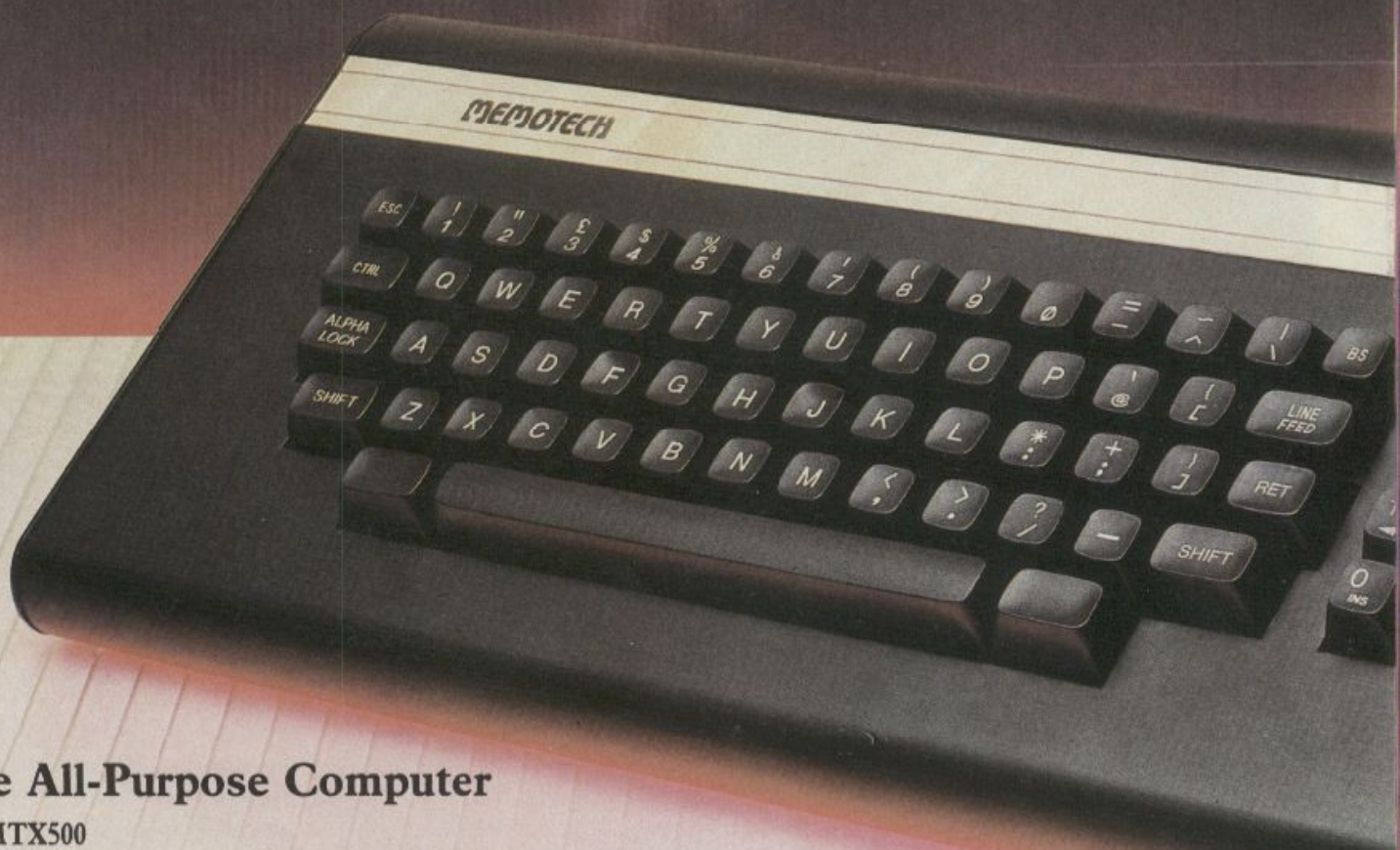
Embedded in the software is our unique score validator which enables us to introduce a new dimension to computer games. The top ten scorers in each calendar month from April through September will receive a "I'm a Black Hole addict" T-shirt and the chance to compete for prizes to the value of £500 in a championship to be held at the end of the year. We will then publish a list of the top 1000 scorers so you can find out just how good you are.

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Software

The MTX500's 16k ROM contains several languages and routines which enable the novice or the experienced programmer to make full use of the machine. Standard languages are MTX BASIC, LOGO and NODDY. ROM routines include an ASSEMBLER/DISASSEMBLER with screen display of the Z80 CPU registers, memory and program which can be manipulated from the keyboard. Machine code programs can be stepped through one instruction at a time, and easily called from within BASIC.

programs. A further feature is the Virtual Screen facility which enables the programmer to define sections of the screen to work independently whilst maintaining all full screen facilities. Pascal is available as an add-on ROM pack.

Hardware

As standard – 32k of user RAM expandable to 512k plus 16k of dedicated video RAM. Sixteen colours, 40 column text, 256 × 192 high resolution graphics with all sixteen colours available and easily moveable user defined graphics (Sprites) combine to make effective screen displays quick and simple to achieve. Standard outputs are centronics printer

Perform



port, two joystick ports, an uncommitted I/O port, 2400 Baud Cassette port, separate TV and Video Monitor ports, 3 voice sound with hifi output plus a dedicated games cartridge port. Other standard features include the Z80A processor running at 4MHz, real time clock, full moving key keyboard with 79 keys including eight function keys and separate numeric pad. Optional expansions include 80 column colour

video board, twin RS232 interfaces, 5¼ and 8 inch floppy disc interfaces to run CP/M, Node interface to enable ring system, plus an A/D and D/A convertors.

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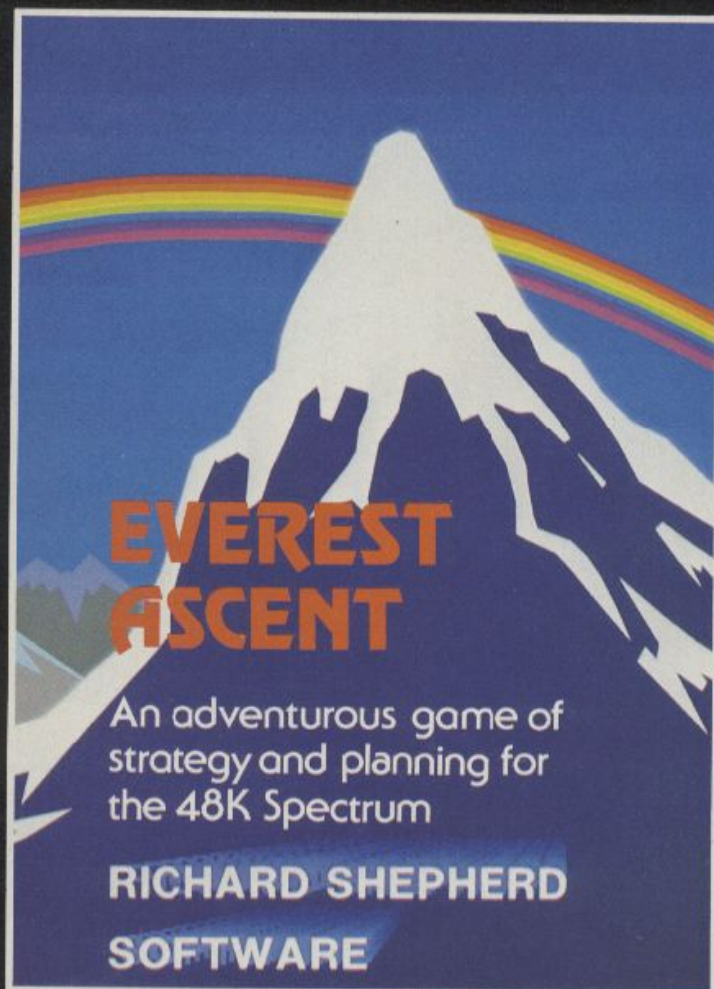
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GAMES

SOFTWARE
REVIEWS

Each month PCT will be presenting pages of reviews of the computer programs currently available. We have engaged a team of reviewers, each of whom is a seasoned user of his/her particular machine — and has the crazy streak that means they enjoy playing computer games!

All types of software will, however, be reviewed in these pages; but with around 85% of all home-computer software being of the playful variety, you will be seeing more games than anything else!

Our 'Ratings Table' headings are:

Program Quality

Here we're looking to see how well written the program is, and how well it exploits the computer's capabilities. Also, how logical is the structure of the program? Does it require the user to make guesses to use it?

Crashproofing

We all hit the wrong key sometimes,

do we not? Go on, admit it. If the program has been well written, all should not be lost. If, for example, the machine is asking you to enter "Yes" or "No", then any other key except Y or N should illicit no response whatsoever. In other words, how tolerant is the program of us humans?

Value For Money

Quite frankly, some software on sale today is vastly overpriced. With the low cost of cassette tapes, why *should* simple games cost up to £12 per tape? We judge this one on an overall basis — how much work have the suppliers put into the program and is the price reasonable?

Presentation On-screen

How good are the graphics used in the program? If the instructions are provided on screen, are they both readable and easy to understand? This section examines the

visual aspects of the package — vital for games!

Ease Of Use

If the program is for, say, an 'action' game, then the author's choice of keys is very important. Try playing "Invaders" with the movement keys reversed, and the "Fire" button right next to 'Reset'! There are many, many ways in which life can be made easy for the program user. We want to see them *all* used!

Supplied Instructions

Regardless of whether the instructions come on sheets of paper, or are presented as text on-screen, they should be as clear and as concise as possible.

Ratings are done on a "Five stars is excellent, one is hopeless" basis, with the reviewer then scoring the supplied package as a whole on a percentage scale.



Title: Jet Pac
Type: Tape
Supplier: Ultimate Play The Game
Machine: Spectrum 16K/48K
Price: £5.50

Jet Pac has you playing the part of a space suited adventurer who finds himself stranded on an alien

planet. To escape, you must first assemble your rocket from its component parts, then collect fuel to power it. All this has to be accomplished while fighting off the local aliens with your Quad Photon Laser Phaser (!!) and collect the various 'goodies' (gems, gold etc) that are lying around.

The game gets its name from the jetpack you wear. This enables you to move round the screen area in all directions. Having refuelled your spaceship you then set off for another planet to collect more valuables and fuel, with yet another set of aliens to contend with.

After four planet-falls your spaceship wears out and you must build another one. In all there are 16 different waves of aliens to contend with and each react in a different manner.

The game can be played by either one or two players and control is by either Kempston joystick or the keyboard. The high scores are recorded, but unfortunately the player's name is

not.

The graphics are good, with many small touches that put the program well ahead of most others. Movement control is good and the game offers enough variations to make it a highly entertaining and addictive addition to any software library.

Ratings Table

Program Quality	* * * * *
Value for Money	* * * * *
Presentation On-screen	* * * * *
Ease of use	* * * * *
Crashproofing	* * * * *
Supplied Instructions	* * * * *
Overall	94%

Title: The Black Hole
Type: Tape
Supplier: Quest
Machine: Spectrum 16K/48K
Price: £5.50

I always worry when I see advertising packed full of



superlatives. When I saw that the advertising for the Black Hole contained phrases such as: Simply the Best and A New Dimension, alarm bells started ringing. Needless to say my fears were realised.

The graphics were excellent, but after the original impact I found that they lacked variety. The game boasted "Incredible explosive and full sound effects". These were fair, but not particularly impressive. They could have probably reached more explosive proportions if the game was played in conjunction with one of the sound amplifiers which are available for the Spectrum.

The game is written entirely in machine code and therefore is fast. The arrangement of the control keys is slightly odd. They are all on the bottom row of the keyboard. Once you have got used to this arrangement, operation of the game becomes quite fast.

The Black Hole of the game's title flashes away at the centre of the screen. From it emanate alien spacecraft, which exit in any one of three directions. Your spaceship is confined to the left half of the screen and is armed with three weapons. The first is the Neutron Blaster which has a straight beam. Your other two weapons are a positive and negative ion gun. These fire with beams that bend either upwards or downwards, according to their charge.

The game is difficult and takes quite a lot of practice to obtain proficiency. To this end, Quest have included a practice mode which allows you the chance to brush up on your technique.

Every month they are giving away ten T-shirts as prizes to the people with the highest score. You might even get a chance to compete in a championship at the end of the year with prizes worth

up to £500.

In conclusion, the game is good and fun to play, but I wouldn't class it as a classic.

Ratings Table

Program Quality	* * * *
Value for Money	* * * *
Presentation On-screen	* * * *
Ease of use	* * *
Crashproofing	* * * *
Supplied Instructions	* * * *
Overall	75%

Title:	Transylvanian Tower
Type:	Tape
Supplier:	Richard Shepard Software
Machine:	48K Spectrum
Price:	£6.50

Good idea this. Battle your way through the Vampires Lair and stake out Dracula himself! Nice graphics too — corridors in perspective, doors, windows and the inevitable bats swooping about.

All good stuff — but all brought to nought by a lousy game system that makes for excruciatingly boring play action. It takes AGES to draw you a floor map of where you are — I'd lost interest by the time it finished — and even longer to move from one floor to the next. (Some minutes in fact).

The tape is billed as a mixture of action and adventure in as much as that you have to shoot down 20 bats to advance to the next level AND find your way through a maze, picking up artifacts as you go. Count Dracula is only to be found higher up the Tower. Trouble is I found it very difficult to get there. Not because the game is so difficult that you die a lot whilst learning, but because I found it totally uninteresting after a very short time indeed.

A game of any sort should be playable immediately and thereafter offer a return directly related to the effort expended. In Transylvanian Tower you can stagger around for half-an-hour trying to figure out what a nice person like you is *doing* in a place like this, only to step out onto Floor 2 and get treated as a Wimpy by a Vampire Bat that no-one has told you how to kill! Infuriating to the point of tape crunching.

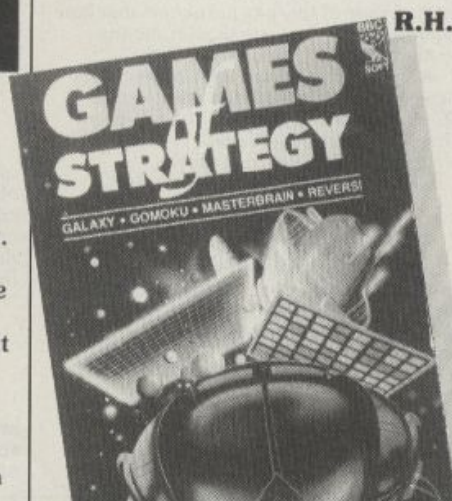
This is basically a good product, but someone needs to go

over it from the point of view of GAME design as opposed to PROGRAM design AND do something about the instructions. They are neither informative or concise.

As a demonstration of Spectrum graphics — excellent. As a thrilling and absorbing adventure ... Shame.

Ratings Table

Program Quality	* * *
Value for Money	* * *
Presentation On-Screen	* * * *
Ease of use	*
Crashproofing	* * * *
Supplied Instructions	* *
Overall	49%



Title:	Games of Strategy
Type:	Tape
Supplier:	BBC Publications
Machine:	BBC A or B
Price:	£10.00

This pack contains 4 popular strategy games: Galaxy, Gomoku, Masterbrain and Reversi.

Galaxy is a fairly standard version of the popular computer game 'Star Trek'. As captain of the starship 'Endeavour', the player's mission is to rid the galaxy of the evil Kryons before a certain stardate. To replenish the Endeavour's energy supply you must dock at one of the starbases you find scattered throughout the galaxy.

The difficulty level (1-3) influences the time in which the mission is to be accomplished. The number of Kryons and the number of starbases. The enemy can be destroyed using phasors or photon torpedoes. 64 sectors comprise the galaxy and each of these is in turn divided into 64 sub-areas. It is

through these that you steer your craft and battle towards your destiny.

Gomoku is similar to the game 'Connect 4', except that the object is to get five not four pieces in a row. The board is a 19 by 19 grid and the object is to beat the computer into getting a row of five pieces either horizontally, vertically or diagonally. The pieces are positioned on the board by directing a cursor to the required cell.

Masterbrain is yet another version of the popular board game Mastermind. The object of the game being to guess a colour code chosen by your opponent. In this version you have to guess a four-digit number which the computer chooses, in as few goes as possible. After each guess the computer marks your attempt and tells you how many digits you have guessed correctly. You can reverse the game play and have the computer guess a code which you decide.

The final game on the tape is another old favourite, Reversi. This is the computer version of Othello. In it you have to capture enemy pieces by blocking them either end with counters of your own colour. When captured, the enemy pieces change to your colour and your opponent the winner of the game is simply the player who has most pieces of his own colour on the board when it becomes full.

None of the programs are particularly stunning display-wise having been written in Mode 2 to ensure their working in the Model A. Despite these limitations they are quite enjoyable. The two board games, Gomoku and Reversi play to a reasonable standard. Although none of these programs are brilliant, they offer good value for money.

Ratings Table

Program Quality	* * *
Value for Money	* * *
Presentation On-Screen	* * *
Ease of use	* * * *
Crashproofing	* * * *
Supplied Instructions	* * *
Overall	60%

Title: Mdar Maul
Type: Tape
Supplier: Imagine
Machine: Spectrum 16K/48K
Price: £5.50

Here you are faced with the care of a mouthful of virgin-white teeth.

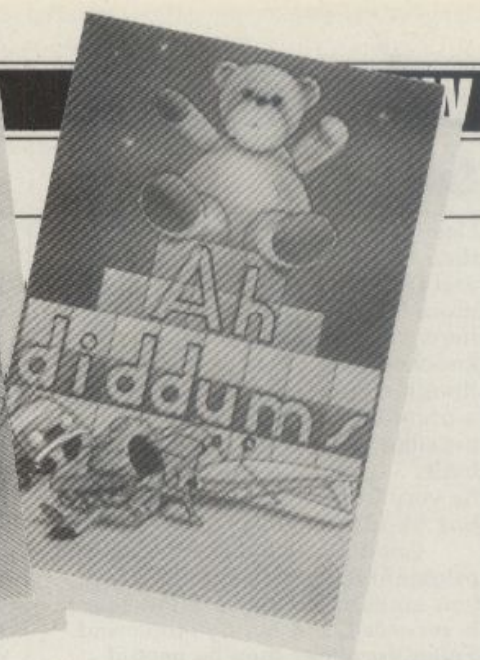
You are supplied with three toothbrushes and a never ending supply of IMAGICO toothpaste. First you must position your toothbrush next to the tube of toothpaste to load your brush with paste. Once you have prepared your brush you must rush round the mouth, scrubbing teeth as you go, hopefully preventing decay. Meanwhile the nasty little bacteria are happily floating around attaching themselves to your teeth and causing them to decay. Should you let four teeth become permanently damaged then you loose one of your toothbrushes. If your use up a whole tube of toothpaste then the bacteria level increases and you must work harder to keep your teeth intact.

Various sweets appear and when the bacteria eat them they become more powerful. The graphics are bold and colourful but not very exciting. Although the game requires you to keep up a high level of concentration and dexterity there is not enough variation in what happens to make this a game that is going to become particularly addictive. Certainly good fun and appeals to the kids. . . trouble is they end up playing it when they should be cleaning their own teeth.

The high score is shown as the highest bacteria level reached. Although the high scores are retained they do not include the players name, Joysticks can be used but I found keyboard operation acceptable.

Ratings Table

Program Quality	* * * *
Value for Money	* * *
Presentation On-screen	* * *
Ease of use	* * * *
Crashproofing	* * * * *
Supplied Instructions	* * * *
Overall	77%



Title: Ah Diddums
Type: Tape
Supplier: Imagine
Machine: Spectrum 16K/48K
Price: £5.50

Baby is crying so the light has been left on in the nursery and when the light is on the toys are happy because they can play all night. But Teddy loves baby and wants to comfort her. . . if he stops her crying the light will be turned out and the toys will have to go to sleep. Such is the scenario for Ah Diddums, you are Teddy trying to get out of your toybox and the other toys are dead set on trying to stop you reaching baby. Sadly you are in a nested set of 99 (yes 99!!) toyboxes and you must pick up all the play bricks in each box to build a staircase out of each one!

Meanwhile the toys are trying to stop you and the nearer you get to baby the nastier the toys get and more of them join in stop you. Teddy has some help along the way: he may pick up some things and throw them at the toys, he can also use a peashooter to some advantage. He also has a friend in the 'Jack in the Box' who will stop the toys moving for a while. . . when he is awake!

The graphics are colourful and attractive, particularly Teddy as he clammers around his box. I would like to meet baby, in fact I would like to meet anyone who has met baby because having only got to box 10 and been beset by flying airoplanes, golliwogs, spinning tops and toy trains. I really believe it must be well nigh impossible, but then I'm sure someone will prove me wrong!

A thoroughly enjoyable game with the slight reservation that I would have liked to believe that one day I might win through! The review tape seemed to have a bug in that if I held the peashooter too

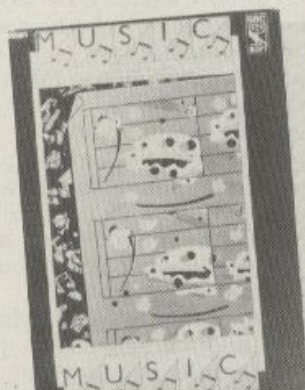
GAMES

close to the unstoppable plasticene then the peashooter disappeared and I was unable to pick up any more bricks. The only solution here was to get my stuffing knocked out by one of the nasties. Imagine believe we may have had a preproduction tape so it is possible yours will not have this fault...but be warned, this could be very frustrating if you were in box 98 with one life left!

Good fun, good graphics...an original idea which should keep you amused for hours. High score is recorded, but not by name and Fuller Joysticks may be used if desired. Keyboard operation is quite easy and effective.

Ratings Table

Program Quality	* * * * *
Value for Money	* * * *
Presentation On-screen	* * * *
Ease of use	* * * * *
Crashproofing	* * *
Supplied Instructions	* * * *
Overall	83%



Title: Music
Type: Tape
Supplier: BBC Publications
Machine: BBC A or B
Price: £10.00

This package allows the creation of tunes in up to three parts. These tunes can then be edited, speeded up, slowed down and SAVED to tape. The package also offers a choice of four different instrument voicings.

On running the program three staves are printed on the screen and the computer waits for your first command. Your tune is played into the computers memory by using two rows of keys on the keyboard (a diagram showing the corresponding notes is supplied). Wrong notes can be erased using the DELETE key. A horizontal bar representing a note is displayed on the corresponding line of the stave; the longer the bar, the longer the

note.

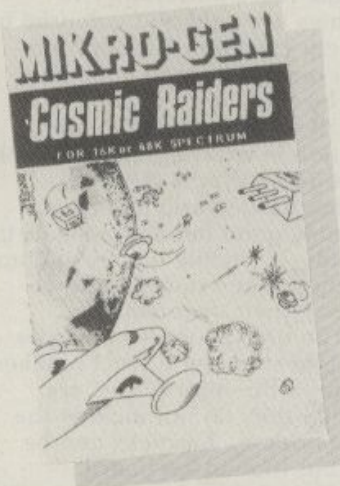
The four instruments voicings supplied are: organ, harpsicord, violin and piano. However, these do not really sound much like their instrument counterparts. The tempo of the piece can be altered between 0 (slow) and 9 (fast). It is possible to play back the contents of the three staves separately, as well as in unison.

Although the package is capable of producing quite impressive results it does suffer from quite a serious fault. For instance if you play in tune containing a mixture of crotchets (single beats) and quavers (half beats), on playback all the notes will be the same length. The greatly restricts the degree of complication of rhythm that can be used. The program doesn't exactly stretch the limit of the BBC Micro.

For this price I would expect a program designed specifically for the Model B, incorporating high-resolution graphics to display staves and notes, a wider choice of instruments and the ability to define your own sound.

Ratings Table

Program Quality	* * *
Value for Money	* *
Presentation On-screen	* *
Ease of use	* * *
Crashproofing	* * * *
Supplied Instructions	* * *
Overall	55%



Title: Cosmic Raiders
Type: Tape
Supplier: Mikro Gen
Machine: ZX Spectrum 16K
Price: £5.95

Before we go any further "BUY THIS GAME" you will not be dissatisfied, that I can guarantee. This version of "Defender" is one of

the very few times I have seen an implementation of an arcade game where the original has actually been improved upon.

The objective is much clearer than Defender in as much as you are launched from a city complex on an alien planet. There are humanoids in this city area who jump up and down in excitement when you fly over them or when they are being dropped to their painful and untimely death by the naughty green grabber. To stop millions of grabbers, defenders, interceptors and escorts appearing on screen you must race to the other side of the planet to destroy the master ships in their lair. If there is just one master ship left intact it can procreate new baddies at a tremendous rate.

While you are going for the mastership, the grabbers with the protection of the escorts are having a fun time abducting the poor humanoids. This is where the hard earned talents you mastered at Defender come into play. The safest way to deal with this problem is to use one of the three smart bombs you are given to knock out all the baddies on the screen then catch the humanoids as they fall. If you miss one there is a sickening splat as the humanoid hits the deck.

The carnage levels are precisely worked out to give the novice a chance to last more than ten seconds and the dead eye dick to sweat at the high levels. At the top of the screen is a plot of the whole planet surface showing the position of your ship in relation to the baddies so you can plan the attack just like the real thing.

There is no provision for joystick control in this game but this surprisingly was not a drawback because the keyboard positions used are the best/fastest I've come across. With a good range of nasties and clear sound this is a very good game for the 48K Spectrum and an absolute must for 16K.

Ratings Table

Program Quality	* * * * *
Value for Money	* * * * *
Presentation On-screen	* * * * *
Ease of use	* * * * *
Crashproofing	* * * * *
Supplied Instructions	* * * * *
Overall	83%

P.G.



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- PROGRAMS FOR COMMODORE VIC 20 [Trademark of Commodore Electronics Ltd.].

Announcing more exciting programs for the BBC.

Acornsoft is the software division of Acorn Computers, the company that designed and built the BBC Microcomputer. Here are four more exciting programs, all designed to get the most from your BBC Micro.

Starship Command (£9.95) is a demanding high-resolution graphics game in which you command a starship against attacking alien ships. You control the forward drive and rotational thrust of your ship, which is equipped with shields, long and short-range scanners and a sector display of the stars and alien ships.

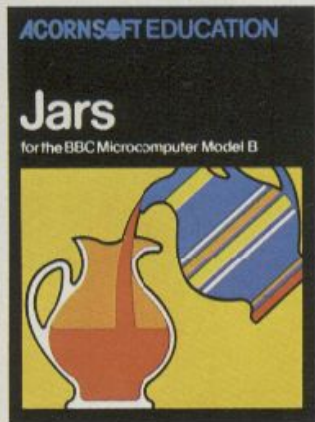
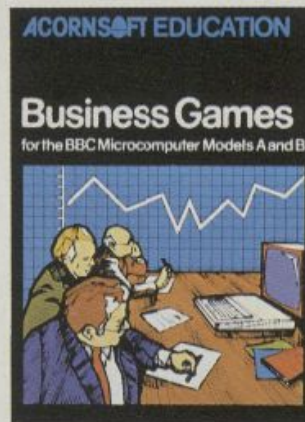
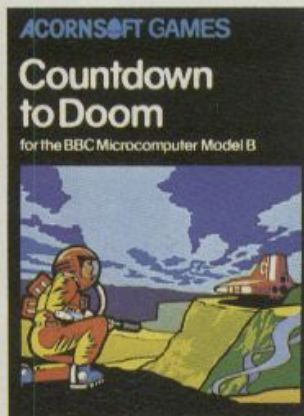
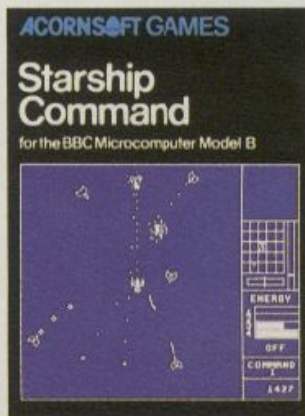
Countdown to Doom (£9.95) is a race against time as you strive to repair your damaged space ship in the corrosive atmosphere on the planet Doomawangara (Doom). Beat the clock or resign yourself to a life in the wilderness of Doom.

Business Games (£9.95) is a cassette containing two games designed for economics, business or general studies teaching.

In Stokmark, up to eight players compete in buying and selling shares aided by a screen display of relevant market information.

In Telemark, players compete to dominate in the manufacture and sale of televisions. The winner is the one who makes the largest profit or controls over half the total market.

Jars (£11.90) is an educational cassette suitable for 7-13 year olds. The objective of the program is to present, what are usually thought of as purely numerical problems, in a visual way. Jars of liquid are used to visualise volume estimation and fraction problems. Success, partial success or failure is noted by a scoring system and suitable comments.



How to get Acornsoft programs.

If you're a credit card holder and would like to buy cassettes of the programs shown in this advertisement, or if you would like to know the address of your nearest stockist, just phone 01-200 0200.

Alternatively, you can buy the cassettes directly by sending off the order form below to:
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ACORNSOFT

GAMESBOARD

GORILLASSI

**Capture enemy gorillas in this game
of strategy for the Texas TI99/4A**

This game is played exactly like Othello. It is a board game for two players, played on a conventional chess board with eight by eight squares. The pieces are double sided, coloured black on one side and white on the other. Any of the opponents pieces in a straight line between the last piece played and another of the player's pieces is captured, that is to say turned over, to convert it to that player's colour. The game finishes when the board is covered with pieces or when neither player can move, and the winner is the player with the most pieces at that stage.

To make the game more interesting, instead of black and white counters there are black and white gorillas, as the name suggests.

Running The Program

When the program is run it asks for your name, it can then refer to you personally as the game goes on. It then plays a rendition of Sweet and Low before printing out the playing board. This consists of dark green and red squares numbered 1 to 8 down the side and 2 to 9 across the top. The computer then asks you if you want to go first, to this you

must either type a "Y" or an "N". If you typed a "Y" then it will ask you for a row number, once that is pressed the computer proceeds to put your gorilla onto the board. If a counter is already there, it calls you a cheat and proceeds to have its move. If you cannot capture any gorillas at that square then the computer ignores your move.

To find out the score, just type 00 instead of the row and column. In the interests of speed the computer does not work out the score after each move, thus at the end of the game 00 has to be entered before your win, lose, draw is confirmed.

HOW IT RUNS

10-30	Clears the screen and inputs your name.		
40-50	This plays the tune, ie. goes to the subroutine at line 2550.	1140-1150	will put the counter.
60-70	Goes to the subroutine which defines the characters and their colours.	1160-1170	The K loop is only of concern when it is the computer's go, this tests to see whose go it is.
80-110	Initialises the arrays and the two strings X\$ and Y\$.	1180-1260	Checks to see if the last go was the human's go.
120-150	Prints "ME" and "YOU" on the left and right of where the playing board will be.	1270-1300	Puts the computer's counter into the array B\$ and your counter into the array C\$.
160-210	These are the main parts of the playing board, ie. the chequered pattern.	1310	Prints out the message for you to input the line and column number.
220-230	These lines piece together the parts of the board into two strings.	1320	Jump to the routine which inputs your move.
240-270	Puts the above strings into the array A\$.	1330-1350	If you input 00 then this jumps to the routine for working out the scores.
280	Restores the data in line 290 in case of another game.	1360-1440	This makes sure that you have not put your counter on top of another, it calls you a cheat if you have.
290-450	Puts each counter into its respective position for the start of the game.	1450-1480	Checks each square on the board to count the number of your pieces and the number of the computer's pieces.
460	The computers	1490-1520	Prints the computer's score onto the screen.
480-620	This routine prints the board onto the screen directly from the array A\$.	1530-1620	Prints your score onto the screen.
630-640	Places two small arrows at the top left hand corner of the screen.	1630-1680	These are the conditions for a win, lose or draw.
650-720	This asks you if you want to go first, then jumps to the appropriate routine.	1690-1700	Tells you that you are a cheat if you try to put your counter onto another counter.
730-810	Puts your counter into the array B\$ and the computer's counter into the array C\$.	1720-1780	Sets move to 0 and goes to the computer's move.
820-870	Sound effects before the computer takes its go.	1790-1880	This records your row number and puts it into Q5.
890	Loop which counts 1 to 60 as the computer looks at each of the possible 60 places to go.	1890-1910	This records your column number and adds it to Q4.
900	More sound effects.	1920-1930	This puts the value of your move into B and returns to the main program.
910	This takes information from the computer's strategy with the aid of the loop K.	1950	Tests for the colour of the background and if it is dark green then jump to line 2080.
920	Tests to see if there is anything already on that square.	1960-2010	If there is a white gorilla needed then goto line 2020.
930-1130	Tests to see if there are any counters which can be captured and if so then that is where the computer	2020-2070	Print a black gorilla with a red background.
		2090	Print a white gorilla with a red background.
			If there is a white gorilla needed then goto line 2160.

GORILLASSI

2100-2150	Print a black gorilla with a dark green background.	2630-2800	Data for the tune.
2160-2210	Print a white gorilla with a dark green background.	2810	Terminates the tune.
2220-2460	Clears the screen and defines all the characters.	2820-2930	End routine for if the computer has beaten you.
2470	Changes the screen colour to cyan.	2940-3050	End routine for if you beat the computer.
2480-2540	Defines the colours of all the characters then returns to the main program.	3060-3170	End routine for a draw.
2550-2620	Routine for playing the three player tune Sweet and Low.	3180-3220	Asks you if you want another game.
		3230-3350	Alternates the colours on the board, checking to see if you have pressed a key also.
		3360	If you pressed "Y" then start a new game.
		3370-3410	Prints out GOODBYE on the screen and stops.

HINTS ON CONVERSION

TI BASIC is fairly standard so only its graphics commands will need explanation.

CALL HCHAR(ROW,COLUMN,ASCII NUMBER,NUMBER
OF REPETITIONS)

This places a character or row of characters starting from (ROW,COLUMN) and moving right to the specified number of repetitions. If the last parameter is left out then only one character is printed.

CALL VCHAR(ROW,COLUMN,ASCII NUMBER,NUMBER
OF REPETITIONS)

This is exactly as above except that it repeats down the screen instead of to the right.

CALL CLEAR

This clears the entire screen.

CALL GCHAR(ROW,COLUMN,VARIABLE)

This looks at the position (ROW,COLUMN) on the screen, then puts the ASCII code of that character into your variable.

CALL SOUND(DURATION,NOTE or NOISE,VOLUME)

CALL CHAR(ASCII NUMBER, "HEX REPRESENTATION")

This is used to define the characters. The HEX REPRESENTATION bit is made up of eight HEX numbers, each describing one line of an eight bit character.

CALL KEY(0,KEY,STATUS)

This is used to scan the keyboard, if a key has been pressed its ASCII code will end up in a variable, in this case KEY. The

STATUS indicates the following:-

+1 A new key was pressed since the last performance of the CALL KEY routing.

- 1 The same key was pressed during the performance of CALL KEY as was pressed during the previous performance.

0 No key was pressed.

CALL SCREEN(COLOUR CODE)

This changes the colour of the entire screen, using the following colour codes:-

1	TRANSPARENT	9	MEDIUM RED
2	BLACK	10	LIGHT RED
3	MEDIUM GREEN	11	DARK YELLOW
4	LIGHT GREEN	12	LIGHT YELLOW
5	DARK BLUE	13	DARK GREEN
6	LIGHT BLUE	14	MAGENTA
7	DARK RED	15	GRAY
8	CYAN	16	WHITE

CALL COLOR (CHARACTER GROUP, FOREGROUND
COLOUR, BACKGROUND COLOUR)

The characters are grouped in eights from 32 to 159.

For example, CALL COLOR(1,2,16) will make all the characters from 32 to 39 be black with white backgrounds.

PROGRAM LISTING

[illegible]

```

520 CALL HCHAR(X,Y,ASC(AB(1,D)))
530 Y=Y+1
540 NEXT D
550 X=X+1
560 Y=Y
570 FOR D=A TO A+19
580 CALL HCHAR(X,Y,ASC(AB(2,D)))
590 Y=Y+1
600 NEXT D
610 X=X+1
620 NEXT A
630 CALL HCHAR(2,3,54)
640 CALL HCHAR(1,4,33)
650 REM DECIDE WHO IS TO MOVE FIRST
660 H$="DO YOU WANT TO GO FIRST ?"
670 FOR I=1 TO LEN(H$)
680 CALL HCHAR(21,I,ASC(SEQ$(H$,I,1)))
690 NEXT I
700 CALL KEY(0,K,S)
710 IF S=0 THEN ?00
720 IF K=ASC("N") THEN ?180
730 REM COMPUTER'S MOVE
740 B$(1,1)="A"
750 B$(1,2)="B"
760 B$(2,1)="C"
770 B$(2,2)="D"
780 C$(1,1)="H"
790 C$(1,2)="I"
800 C$(2,1)="J"
810 C$(2,2)="L"
820 FOR T$=1 TO 4
830 FOR T1=1 TO 5
840 CALL SOUND(-200,500,T1*20,T$*4)
850 NEXT T1
860 CALL SOUND(-200,250,12,266*10)
870 NEXT T2
880 CALL HCHAR(21,1,32,128)
890 FOR K=1 TO 50
900 CALL SOUND(-10,900,0)
910 B=ASC(SEQ$(C$,K,1))-21
920 IF (B$(1,2)*B) < ""*(B$(1,2)*C)," THEN 1150
930 H=0
940 FOR N=1 TO 0
950 N=ASC(SEQ$(B$,N,1))-50
960 E=0
970 F=B
980 IF (B$(1,(F+H)*2) < B$(1,2)) THEN 1020
990 E=1
1000 F=F+H
1010 OF=0
1020 IF (B$(1,(F+H)*2) < C$(1,2))*(E=0) THEN 1130
1030 FOR A=B*2 TO F*2 STEP N*2
1040 A$(1,A-1)=C$(2,1)

```



```

1050 A$(1,A)=C$(2,2)
1060 LINE=1+2*INT((A-1)/20)
1070 COL=4+A-20*INT((A-1)/20)
1080 GOSUB 1920
1090 A$(2,A-1)=C$(2,1)
1100 A$(2,A)=C$(2,2)
1110 H=1
1120 NEXT A
1130 NEXT X
1140 IF (B$(1,1)="h")+(H=1) THEN 1160
1150 NEXT K
1160 IF B$(1,1)="h" THEN 740
1170 IF H=0 THEN 1370
1180 REM HUMANS MOVE
1190 B$(1,1)="h"
1200 B$(1,2)="i"
1210 B$(2,1)="j"
1220 B$(2,2)="k"
1230 C$(1,1)="a"
1240 C$(1,2)="b"
1250 C$(2,1)="c"
1260 C$(2,2)="d"
1270 MSG$="WHERE TO?"$N$"00 FOR SCORE"
1280 FOR I=1 TO LEN(MSG$)
1290 CALL HCHAR(21,I,ASC(SEG$(MSG$,I,1)))
1300 NEXT I
1310 GOSUB 1710
1320 IF B=0 THEN 1370
1330 IF (A$(1,B#2)=""$*(A$(1,B#2)=""$)) THEN 1340 ELSE 1350
1340 GOTO 1630
1350 GOTO 930
1360 REM CALCULATE SCORE
1370 CP=0
1380 HP=0
1390 FOR A=23 TO 177 STEP 2
1400 IF A$(1,A)="h" THEN 1410 ELSE 1420
1410 CP=CP+1
1420 IF A$(1,A)="a" THEN 1430 ELSE 1440
1430 HP=HP+1
1440 NEXT A
1450 MSG$=STR$(CP)+$*
1460 FOR I=1 TO LEN(MSG$)
1470 CALL HCHAR(10,I+2,ASC(SEG$(MSG$,I,1)))
1480 NEXT I
1490 MSG$=STR$(HP)+$*
1500 FOR I=1 TO LEN(MSG$)
1510 CALL HCHAR(10,I+2,ASC(SEG$(MSG$,I,1)))
1520 NEXT I
1530 IF HP=0 THEN 2020
1540 IF CP=0 THEN 2040
1550 IF CP+HP<64 THEN 1180
1560 IF CP>HP THEN 1570 ELSE 1580
1570 GOTO 2020
1580 IF CP<HP THEN 1590 ELSE 1600
1590 GOTO 2040
1600 IF CP=HP THEN 1610 ELSE 1620
1610 GOTO 3060
1620 END
1630 REM INVALID MOVE
1640 CALL SOUND(-4000,-1,0)
1650 MSG$="CHEAT—I WON'T PLAY NEXT TIME?"
1660 FOR I=1 TO LEN(MSG$)
1670 CALL HCHAR(21,I+1,ASC(SEG$(MSG$,I,1)))
1680 NEXT I
1690 B=0
1700 GOTO 730
1710 M=5
1720 Q$=""
1730 CALL HCHAR(24,M,33)
1740 CALL SOUND(-100,300,0)
1750 CALL KEY(0,K,S)
1760 IF S=1 THEN 1700
1770 IF (K<40)+(K>56) THEN 1710
1780 CALL HCHAR(24,M,K)
1790 M=M+2
1800 Q$=Q$+STR$(K-48)
1810 CALL HCHAR(24,M,34)
1820 CALL SOUND(-100,300,0)
1830 CALL KEY(0,K,S)
1840 IF S=0 THEN 1830
1850 IF K=ASC("C") THEN 1710
1860 IF (K<40)+(K>56) THEN 1810
1870 CALL HCHAR(24,M,K)
1880 Q$=Q$+STR$(K-48)
1890 B=VAL(Q$)
1900 Q$=""
1910 RETURN
1920 CALL DCAR(LINE,COL,CHR)
1930 IF (CHR=44)+(CHR=104)+(CHR=120) THEN 2000
1940 REM SQUARE IS REI
1950 IF C$(1,1)="h" THEN 2020
1960 CALL HCHAR(LINE,COL,97)
1970 CALL HCHAR(LINE,COL+1,98)
1980 CALL HCHAR(LINE+1,COL,99)
1990 CALL HCHAR(LINE+1,COL+1,100)
2000 CALL SOUND(-100,110,30,110,30,550,30,-4,0)
2010 RETURN
2020 CALL HCHAR(LINE,COL,112)
2030 CALL HCHAR(LINE,COL+1,113)
2040 CALL HCHAR(LINE+1,COL,114)
2050 CALL HCHAR(LINE+1,COL+1,115)
2060 CALL SOUND(-100,110,30,110,30,660,30,-4,0)
2070 RETURN
2080 REM SQUARE IS D, GREEN
2090 IF C$(1,1)="h" THEN 2160
2100 CALL HCHAR(LINE,COL,120)
2110 CALL HCHAR(LINE,COL+1,121)
2120 CALL HCHAR(LINE+1,COL,122)
2130 CALL HCHAR(LINE+1,COL+1,123)
2140 CALL SOUND(-100,110,30,110,30,770,30,-4,0)
2150 RETURN
2160 CALL HCHAR(LINE,COL,104)
2170 CALL HCHAR(LINE,COL+1,105)
2180 CALL HCHAR(LINE+1,COL,106)
2190 CALL HCHAR(LINE+1,COL+1,107)
2200 CALL SOUND(-100,110,30,110,30,880,30,-4,0)
2210 RETURN
2220 CALL CLEAR
2230 CALL CHAR(33,"00010087F3E100")
2240 CALL CHAR(34,"0000022E3F2E0000")
2250 CALL CHAR(40,"FF00000000000000")
2260 CALL CHAR(41,"00000000000000FF")
2270 CALL CHAR(42,"8080800000000080")
2280 CALL CHAR(43,"0101010101010101")
2290 CALL CHAR(44,"FFFFFFF000000000")
2300 CALL CHAR(56,"0000000000000000")
2310 CALL CHAR(104,"0304000304040094")
2320 CALL CHAR(105,"C02050100C021229")

```

```

2330 CALL CHAR(106,"A0A4A4947509327C")
2340 CALL CHAR(107,"252525259E904C3E")
2350 CALL CHAR(112,"0304000304040094")
2360 CALL CHAR(113,"C02050100C021229")
2370 CALL CHAR(114,"A0A4A4947509327C")
2380 CALL CHAR(115,"252525259E904C3E")
2390 CALL CHAR(120,"0304000304040094")
2400 CALL CHAR(121,"C02050100C021229")
2410 CALL CHAR(122,"A0A4A4947509327C")
2420 CALL CHAR(123,"252525259E904C3E")
2430 CALL CHAR(37,"0304000304040094")
2440 CALL CHAR(38,"C02050100C021229")
2450 CALL CHAR(39,"A0A4A4947509327C")
2460 CALL CHAR(100,"252525259E904C3E")
2470 CALL SCREEN(8)
2480 CALL COLOR(1,9,1)
2490 CALL COLOR(2,13,1)
2500 CALL COLOR(3,2,9)
2510 CALL COLOR(10,16,13)
2520 CALL COLOR(11,16,9)
2530 CALL COLOR(12,2,13)
2540 RETURN
2550 FOR I=1 TO T
2560 RESTORE 2630
2570 READ N1,N2,N3
2580 IF N1=0 THEN 2610
2590 CALL SOUND(-4000,N1,0,N2,0,N3,0)
2600 GOTO 2570
2610 NEXT I
2620 RETURN
2630 DATA 392,311,233,392,311,233,392,311,233,523,370,220,523,370,220,523,
370,220
2640 DATA 466,392,233,466,392,311,466,392,294,622,415,262,622,415,262,622,
415,252
2650 DATA 622,392,233,587,349,233,523,311,233,466,294,175,466,294,175,440,
294,233
2660 DATA 523,311,175,523,311,175,523,311,175,466,294,233,466,294,233,466,
294,233
2670 DATA 392,311,233,392,311,233,392,311,233,523,370,220,523,370,220,523,
349,220
2680 DATA 466,392,233,466,392,233,392,311,233,253,349,220,523,349,220,523,
349,220
2690 DATA 698,456,294,587,349,233,622,392,233,523,311,233,523,311,220,587,
311,196
2700 DATA 523,311,175,523,311,196,523,311,220,466,294,233,466,294,233,466,
294,233
2710 DATA 466,415,294,587,415,233,523,415,262,466,415,294,523,415,311,466,
415,234
2720 DATA 466,392,311,622,392,311,523,370,311,466,392,311,466,392,311,466,
392,311
2730 DATA 466,415,294,587,415,233,523,415,262,466,415,294,523,415,311,466,
415,294
2740 DATA 466,392,311,622,392,311,440,370,311,466,392,311,466,392,311,466,
392,311
2750 DATA 622,392,262,622,392,262,622,392,262,622,349,196,622,349,220,587,
311,247
2760 DATA 523,311,208,523,311,208,253,311,208,494,311,208,494,311,208,494,
311,208
2770 DATA 466,392,233,466,392,233,466,392,311,466,415,294,523,415,294,466,
415,294
2780 DATA 466,392,311,466,392,311,466,370,311,466,415,294,253,415,294,466,
415,294
2790 DATA 622,392,277,622,392,277,622,392,277,622,415,262,622,415,262,622,
415,247
2800 DATA 622,392,233,622,392,233,622,392,233,622,392,233,622,392,233,622,
392,233
2810 DATA 0,0,0
2820 CALL HCHAR(21,1,32,120)
2830 M$="*****BAD LUCK!"$N$
2840 M2$="BUT I BEAT YOU!"$STR$(CP)+$*+STR$(HP)
2850 FOR I=1 TO LEN(M$)
2860 CALL HCHAR(21,I,ASC(SEG$(M$,I,1)))
2870 NEXT I
2880 FOR I=1 TO LEN(M2$)
2890 CALL HCHAR(23,I,ASC(SEG$(M2$,I,1)))
2900 NEXT I
2910 T=1
2920 GOSUB 2550
2930 GOTO 3180
2940 CALL HCHAR(21,1,32,120)
2950 M$="*****WELL DONE!"$N$+STR$(CP)+$*+STR$(HP)
2960 M2$="YOU BEAT ME!"$N$+STR$(HP)+$*+STR$(CP)
2970 FOR I=1 TO LEN(M$)
2980 CALL HCHAR(23,I,ASC(SEG$(M$,I,1)))
2990 NEXT I
3000 FOR I=1 TO LEN(M2$)
3010 CALL HCHAR(23,I,ASC(SEG$(M2$,I,1)))
3020 NEXT I
3030 T=1
3040 GOSUB 2550
3050 GOTO 3180
3060 CALL HCHAR(21,1,32,120)
3070 M$="*****THAT WAS CLOSE!"$N$
3080 M2$="A GOOD GAME!"$N$
3090 FOR I=1 TO LEN(M$)
3100 CALL HCHAR(21,I,ASC(SEG$(M$,I,1)))
3110 NEXT I
3120 FOR I=1 TO LEN(M2$)
3130 CALL HCHAR(23,I,ASC(SEG$(M2$,I,1)))
3140 NEXT I
3150 T=1
3160 GOSUB 2550
3170 GOTO 3180
3180 CALL HCHAR(21,1,32,120)
3190 M$="*****ANOTHER GAME!"$N$+STR$(CP)+$*+STR$(HP)
3200 FOR I=1 TO LEN(M$)
3210 CALL HCHAR(21,I,ASC(SEG$(M$,I,1)))
3220 NEXT I
3230 CALL KEY(0,K,S)
3240 CALL COLOR(2,9,1)
3250 CALL COLOR(3,2,13)
3260 CALL COLOR(10,16,9)
3270 CALL COLOR(11,16,13)
3280 CALL COLOR(12,2,9)
3290 CALL SOUND(-10,300,1)
3300 CALL COLOR(2,13,1)
3310 CALL COLOR(3,2,9)
3320 CALL COLOR(10,16,13)
3330 CALL COLOR(11,16,9)
3340 CALL COLOR(12,2,13)
3350 IF S=0 THEN 3230
3360 IF K=ASC("Y") THEN 40
3370 M$="GOODBYE!"$N$
3380 FOR I=1 TO LEN(M$)
3390 CALL HCHAR(23,I,ASC(SEG$(M$,I,1)))
3400 NEXT I
3410 GOTO 3410

```


ZX81

Games from ORWIN SOFTWARE

WHAT THEY SAID ABOUT CASSETTE 4

"quantity as well as quality" *Sinclair User*, Oct '82
 "If each game was on a separate tape and selling for £5 each I would still recommend them" *ZX Computing*, Oct/Nov '82
 "Easy to operate, graphically impressive and good value for money." *The Times*, 11th Dec '82
 Now we have collected another set of 8 excellent games for Cassette 5

CASSETTE 4 8 games for 16K ZX81 £6

ZX-SCRAMBLE (machine code)



With 3 stages. Bomb and shoot your way through the fortified caves.

GALAXY INVADERS (machine code) Fleets of swooping and diving alien craft to fight off.

SNAKEBITE (machine code) Eat the snake before it eats you. Variable speed. (Very fast at top speed.)

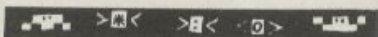
LIFE (machine code) A ZX81 version of the well known game.

3D TIC-TAC-TOE (Basic) Played on a 4 x 4 x 4 board, this is a game for the brain. It is very hard to beat the computer at it.

GUNFIGHT (machine code) Western style shoot-out between 2 players or against the computer.

FUNGALOID (machine code) Bomb the Fungaloids before they grow to the sky or shoot you down.

INVADERS (machine code) 49 aliens and random flying saucers to shoot down.



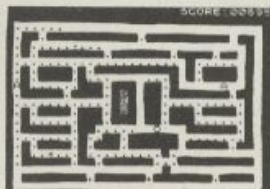
7 of the 8 games are in machine code because it is much faster than Basic. Some of these games were previously available from J. Steadman.

CASSETTE 5 8 games for 16K ZX81 £6

SPACE RESCUE (machine code)



BYTE-MAN (machine code)



BLITZ (machine code)



PLANETOID (machine code) Move your ship and fire missiles in 8 directions to avoid and shoot down the large planetoids and small fliers and bouncers. Rotate left, rotate right, move, fire and hyperspace controls.

DODGEMS (machine code) Dodge the computer's car while eating the dots.

DRAUGHTS (machine code) Play against the computer. Three skill levels.

MERCHANT (Basic) Make your fortune on trading voyages in the Mediterranean and beyond.

7 of the 8 games are in machine code because it is much faster than Basic.

SPACE RESCUE and BYTE-MAN were previously available from Mindseye.

CASSETTE 1, eleven 1K programs £3.80 (including 7 in machine code)

CASSETTE 2, ten 16K games in Basic £5

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1



**Inside...
Latest prices round-up...
Latest software...
Order form...**

Introduction

One thing's certain about the Sinclair world – there's never a dull moment.

Every month sees new software and new hardware, produced by Sinclair enthusiasts, or produced by Sinclair itself.

The magazines do a fantastic job of keeping you up to date with the input of enthusiasts. We want to keep you in touch with Sinclair's own developments.

Every month, there'll be a Sinclair Special in this magazine.

Sometimes, inevitably, there won't be anything new to say – we want to break away from the breathless announcements of hardware and software you just can't buy.

But when something new is available, we want you to have accurate information – fast. You'll find it here.

This month, we're giving you the latest information on the recommended retail prices of Sinclair equipment. They're our prices, and you may well find things cheaper (or dearer) in the shops. If they're cheaper – terrific! Snap them up. Note, however, that from us the ZX81 is down to £39.95.

We're also announcing six superb new Sinclair cassettes for the Spectrum, and three more which make full use of the ZX81. There's an order form at the back of this Special.

Next month... but there, next month is another story! Watch (as they say) this space.

Nigel Searle

Nigel Searle,
Managing Director,
Sinclair Research Ltd.



Spectrum – latest recommended retail prices.



16K was £125.00
16K now £99.95

48K was £175.00
48K now £129.95

ZX Printer was £59.95
ZX81 was £49.95

ZX Printer now £39.95
ZX81 now £39.95



Six new ways to make more of your Spectrum.

Take a look at these brand-new titles. Each is an outstanding new program using the full potential of the Spectrum, for games with stunningly animated graphics, for strategies of fiendish cunning, for masterly applications of computing capability...

Cyrus-IS-Chess Based on the Cyrus Program, which won the 2nd European Microcomputer Chess Championship and trounced the previously unbeaten Cray Blitz machine. With 8 playing levels, cursor piece-movement, replay and 'take-back' facilities, plus two-player option. The 48K version has many additional features including an extensive library of chess openings. For 16K or 48K RAM Spectrum.

Horace and the Spiders Make your way with Horace to the House of Spiders, armed only with a limited supply of anti-spider-bite serum. In the house, destroy the webs before the spiders can repair them. Then destroy the spiders, before they destroy Horace! Undoubtedly the creepiest Horace program ever produced! For 16K or 48K RAM Spectrum.

Computer Scrabble The famous board game, on-screen – with the whole board on view! A huge vocabulary of over 11,000 words. Full-size letter tiles, four skill levels – the highest of which is virtually unbeatable. For 1 to 4 players. For 48K RAM Spectrum.

(SCRABBLE trademark and copyright licensed by Scrabble Schutzrechte und Handels GmbH – a J.W. Spear and Sons PLC subsidiary.)

Backgammon A fast, exciting program, with traditional board display, rolling dice and doubling cube. Four skill levels. For experts – or beginners. (Rules are included – it's the quickest way to learn the game.) For 16K or 48K RAM Spectrum.

FORTH Learn a new programming language, as simple as BASIC, but with the speed of machine code. Complete with Editor and User manual. For 48K RAM Spectrum.

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Overleaf – your Sinclair order form.

Three new ways to get the best out of your ZX81.

The range of Sinclair software for the ZX81 continues to grow.

These three new cassettes offer two totally different challenges to you and your ZX81. The games – like so many ZX81 games today – really do use the ZX81's capability. The FORTH program is a fascinating extension of your own computer understanding.

Sabotage Defender or attacker? The choice is yours in this exciting game.

Be the Guard and defend the randomly placed boxes of ammunition inside the compound – or be the Saboteur and attack the ammunition!

Written by Macronics for a ZX81 with 16K RAM. Cassette price: £4.95.

City Patrol You are the Commander of a laser-firing ship. Your task is to intercept and destroy alien suicide ships descending on your city. Judge your rating as Commander by how many aliens you destroy and how much of your city survives.

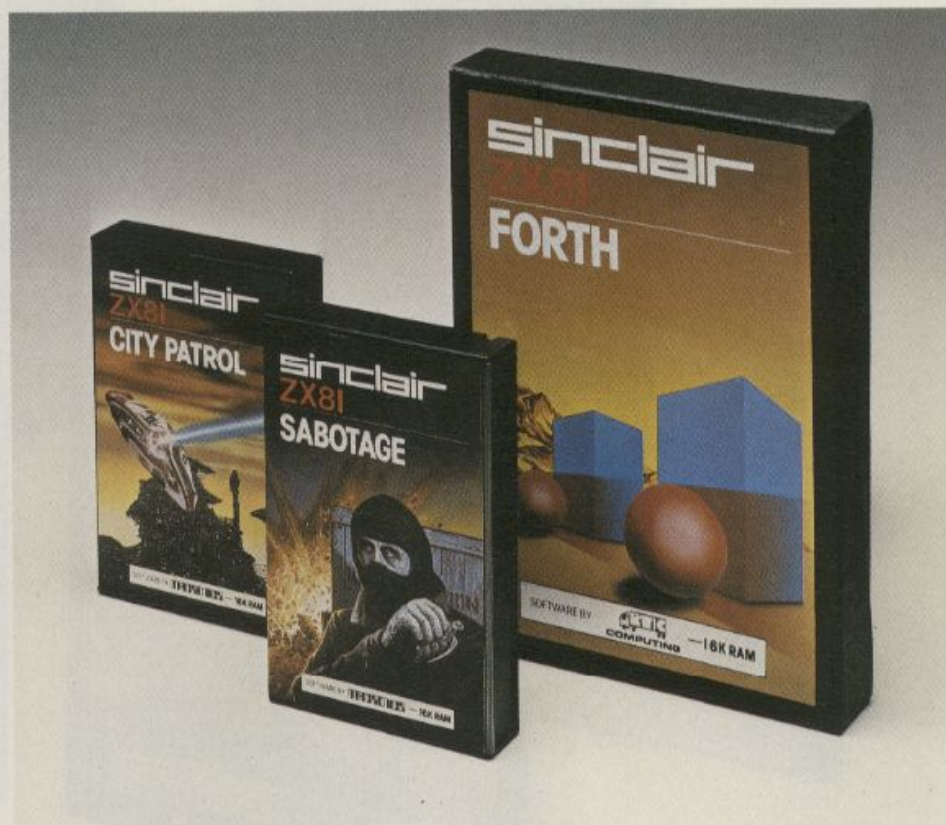
Written by Macronics for a ZX81 with 16K RAM. Cassette price: £4.95.

FORTH Discover a new programming language which combines the simplicity of BASIC with the speed of machine code.

FORTH's compiled code occupies less than a quarter of the equivalent BASIC program and runs ten times as fast. It is fully extendable by the addition of user-defined commands.

Free User-Manual and Editor Manual with each cassette.

Written by Artic for a ZX81 with 16K RAM. Cassette price: £14.95.



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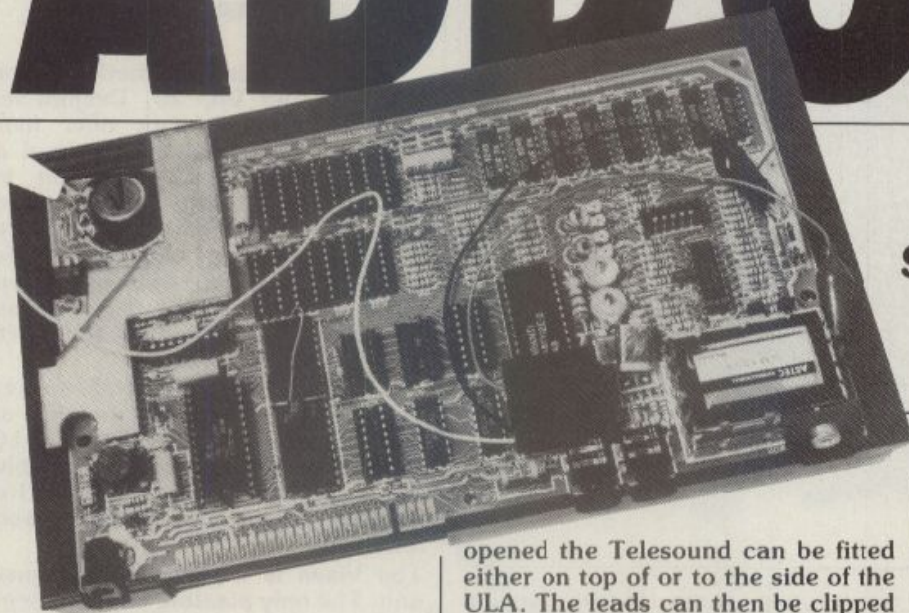
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	G25: Sabotage	2124	4.94	
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PERIPHERALS

ADDONS

**Telesound 84**

Anyone who has a Spectrum must now be tired of straining to hear the plaintive beeps that emanate from its internal speaker. Somehow Space Invaders doesn't sound right without the thunderous sounds of a space battle to complement it. A Redditch based company, Compusound, have come up with a cheap way in which you can increase the volume, if not the quality of your Spectrum's sound.

The unit they have produced is called the Telesound 84. It fits inside the Spectrum case and taps off the signal to the Spectrum's internal speaker and feeds onto the video signal, enabling you to hear the sound through your television speaker. Simple idea this and it works!

The Telesound 84 takes the form of a small plastic cube which contains the conversion circuitry and three leads, each terminating with a crocodile clip. The package comes supplied with full fitting instructions which include a diagram of where to place the unit and where to connect the leads. The instructions also contain a music program.

To fit the Telesound you must open the Spectrum case, taking care not to displace the ribbon connectors from the keyboard. Once

opened the Telesound can be fitted either on top of or to the side of the ULA. The leads can then be clipped to the appropriate places. This is my major criticism of the unit. The clips that terminate the leads are too big to fit inside the case once it is closed. Also, on the Spectrum I fitted it to, the wiring on the board was cut so close it left you very little room to fit the clips anyway.

Seeing that Spectrums are the sort of computers that are likely to be moved around I would think it would be better to carefully solder the connections and dispense with the clips altogether. This would prevent them from coming loose during transit and causing a short circuit when the computer was next used.

When I did get my unit fitted it worked well. There was a little bit of background noise on the signal, but seeing how the Spectrum was never intended to produce this kind of signal, this is acceptable. Unlike other sound expansion units for the Spectrum, the Telesound will work with any software that uses the Spectrum's own internal speaker, making it instantly usable with all commercial software.

In conclusion, the Telesound 84 is a useful addition to any Spectrum but a great deal of care must be taken when fitting it. Further details can be obtained from: Compusound, 32 Langley Close, Redditch, Worcs B98 0ET Tel: 0527-21439. The Telesound 84 costs £9.95 inclusive of packing, postage and a sound effects program.

Give your VIC, Spectrum and Ace peripheral power

Cheetah Spectrum RAM Pack

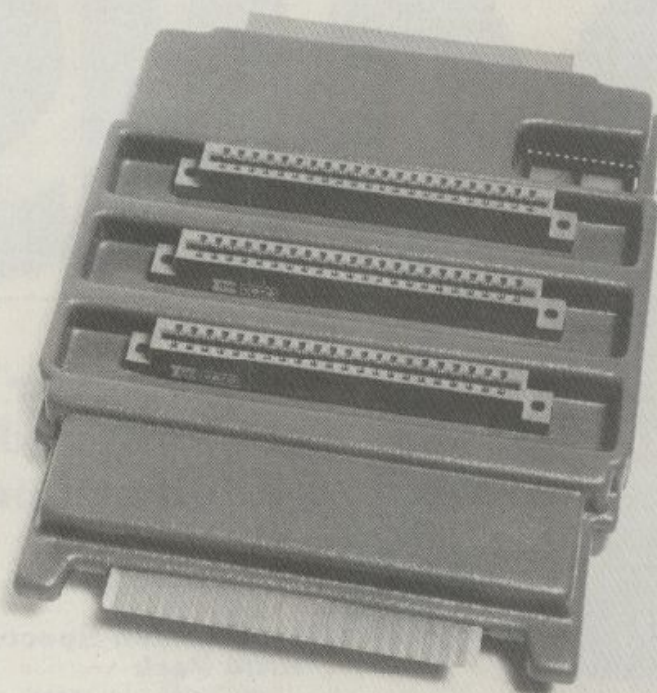
The Cheetah RAM pack fits onto the expansion connector at the back of the Spectrum. It provides an extra 32K of memory, expanding the 16K Spectrum. It provides an extra 32K of memory, expanding the 16K Spectrum up to 48K.

The unit is encased in a tough, black plastic moulded case which fits snugly onto the back of the Spectrum. It features a good quality edge connector which should stand up well to wear and tear. On the back of the pack is a repeat of the Spectrum's edge connector. This enables you to connect other peripherals such as printers to the Spectrum.

The RAM pack worked well when fitted and provides a good way to upgrade your 16K Spectrum, especially if you don't want to open it up and muck about inside.

Further details are available from Cheetah Marketing Ltd, 359 The Strand, London WC2R 0HS. Tel: 01-240-7939. The Cheetah 32K RAM pack costs £39.95.





Vixen Switchable RAM Pack

One of the biggest problems with fitting expansion to the VIC-20 is that the VIC has to be told by the cartridge which block of memory the expansion memory is to be placed. On most cartridges this selection is 'hard-wired' into the cartridge. This has led to problems with cartridges clashing over the same memory space and problems when further expanding the VIC's memory.

Stonechip electronics have produced a 16K memory expansion cartridge which should alleviate these problems. The Vixen 16K RAM pack is the same shape and size as normal VIC cartridges, but recessed into the front of the case are two, two position switches. These switches allow the cartridge to be set into any one of four modes.

Mode 1 has the cartridge operating as a full 16K memory cartridge by placing 8K in each of expansion blocks one and two. Mode 2 sets up the cartridge as one 8K block and one 3K block. The 8K sits in block 1 and the 3K sits in the 3K expansion area. Mode 3 is 3K only, which sits in the 3K expansion area. In this mode the 8K is also present but it is not seen by the computer. The final mode, Mode 4, places 8K in blocks 2 and 3.

When used in this mode the computer does not access the

memory in these blocks, so in essence this setting reduces the VIC to a standard configuration without having to remove the cartridge. Two of these cartridges can be used to bring the VIC up to its maximum memory size.

The cartridge is fitted with a good quality edge connector and is housed in a tough moulded plastic case.

The Vixen represents a thoughtful approach to the subject of VIC memory expansion and will be a great help to any VIC owner who has to use his computer in a

different number of memory sizes. Further details of the Vixen can be obtained from Stonechip Electronics, The Brook Industrial Estate, Deadbrook Lane, Aldershot, Hampshire. Tel: 0252 318260. The Vixen costs £44.95

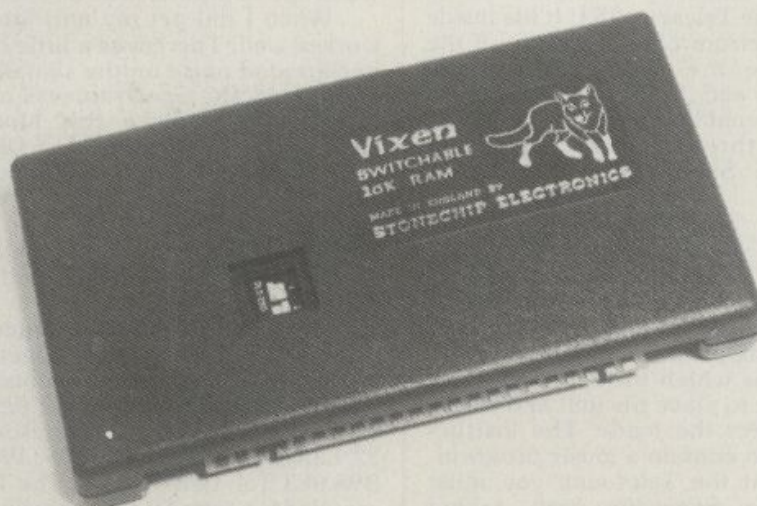
Vixen Expansion System

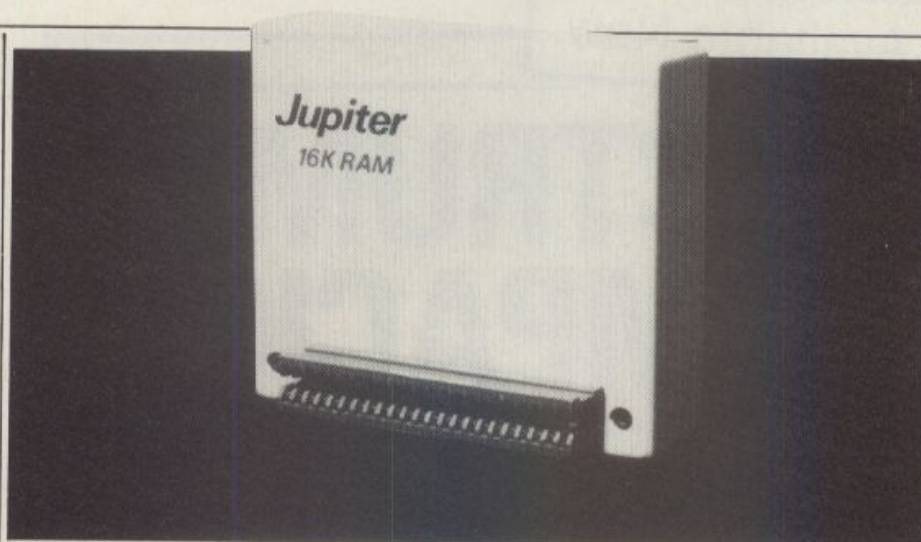
The Vixen is a motherboard for use with the VIC 20. Despite its name it does in fact offer four cartridge expansion sockets and a ROM chip socket. The unit is designed to fit into the cartridge expansion socket on the VIC. Three of the cartridge connectors are mounted in recessed wells on the top of the unit. The fourth is placed on the back of the unit. All of these are good quality connectors.

The Vixen has a 2K ROM socket recessed at the back-right side of the unit. This will accept a type 2716 ROM and therefore will be suitable for use with most of the commercially available ROM based utilities.

The Vixen is a plain, no-nonsense unit. The only possible improvement which could have been made to it is the inclusion of switches to enable the cartridge slots to be selected individually. This would have reduced wear and tear of the cartridge connectors by letting you remove a cartridge from the VIC's memory without having to unplug it.

Further details on the Vixen can be obtained from Stonechip Electronics, The Brook Industrial Estate, Deadbrook Lane, Aldershot, Hampshire. Tel: 0252 318260. The Tandem expansion unit costs £29.95.





Jupiter 16K RAM

From the people who brought you the Jupiter Ace comes a 16K RAM expansion. Designed specifically for use with Ace, this pack draws a lot of its styling from the earlier ZX81 RAM packs.

Slightly larger than a cigarette packet, the RAM pack is finished in a light grey colour and sports the Jupiter logo printed on the front. The construction is solid and the sturdy edge connector should prevent it from suffering from the wobble problems which plagued early ZX81 packs.

The instructions which come with the pack are brief but concise. Included with them is a short FORTH routine which will enable you to test what size memory your Ace has in order for you to check

whether the unit is working correctly.

The Jupiter 16K RAM pack costs £39.95 including VAT and further details can be obtained from Jupiter Cantab Ltd, 22 Foxhollow, Bar Hill, Cambridge CB3 8EP or telephone: (0223) 313479.

Interpod

One of the problems with the VIC is that you are tied to using Commodore peripherals if you want to add a disc drive or a printer to your system. The Interpod unit from Oxford Computer Systems provides a selection of output ports to enable the use of a wide range of peripherals.

Interpod takes the form of a podule moulded out cream coloured plastic. Set into the back of the unit

are connectors for an IEEE connector and two DIN connectors. Into one of these you plug either a VIC or a Commodore 64 and into the other you can plug an IEEE serial device, such as the VIC disc or printer. The full IEEE socket can support any IEEE compatible device. This makes all the Commodore PET peripherals available for use with the VIC.

On the right side of the unit is a socket for the external power supply to plug in. On this side as well is the RS-232-C interface. Using this you are able to connect your VIC or 64 to any compatible RS-232 device. The opens up a whole field of printers and associated devices.

On power up Interpod performs a self-test at the end of which a small red LED will indicate the operational status of the unit.

The manual supplied with the unit contains enough details for you to get Interpod up and running. It also contains example programs showing operation of both RS-232 and IEEE devices. The Interpod is capable of producing error messages and these are explained as well. The manual finishes by giving you pin-out specifications for both the IEEE and RS-232, thus enabling you to work on your own interfacing projects.

The Interpod costs £125.00 and further details are available from Oxford Computer Systems (Software) Ltd, Hensington Road, Woodstock, Oxford OX7 1JR. Tel: 0993 812700.



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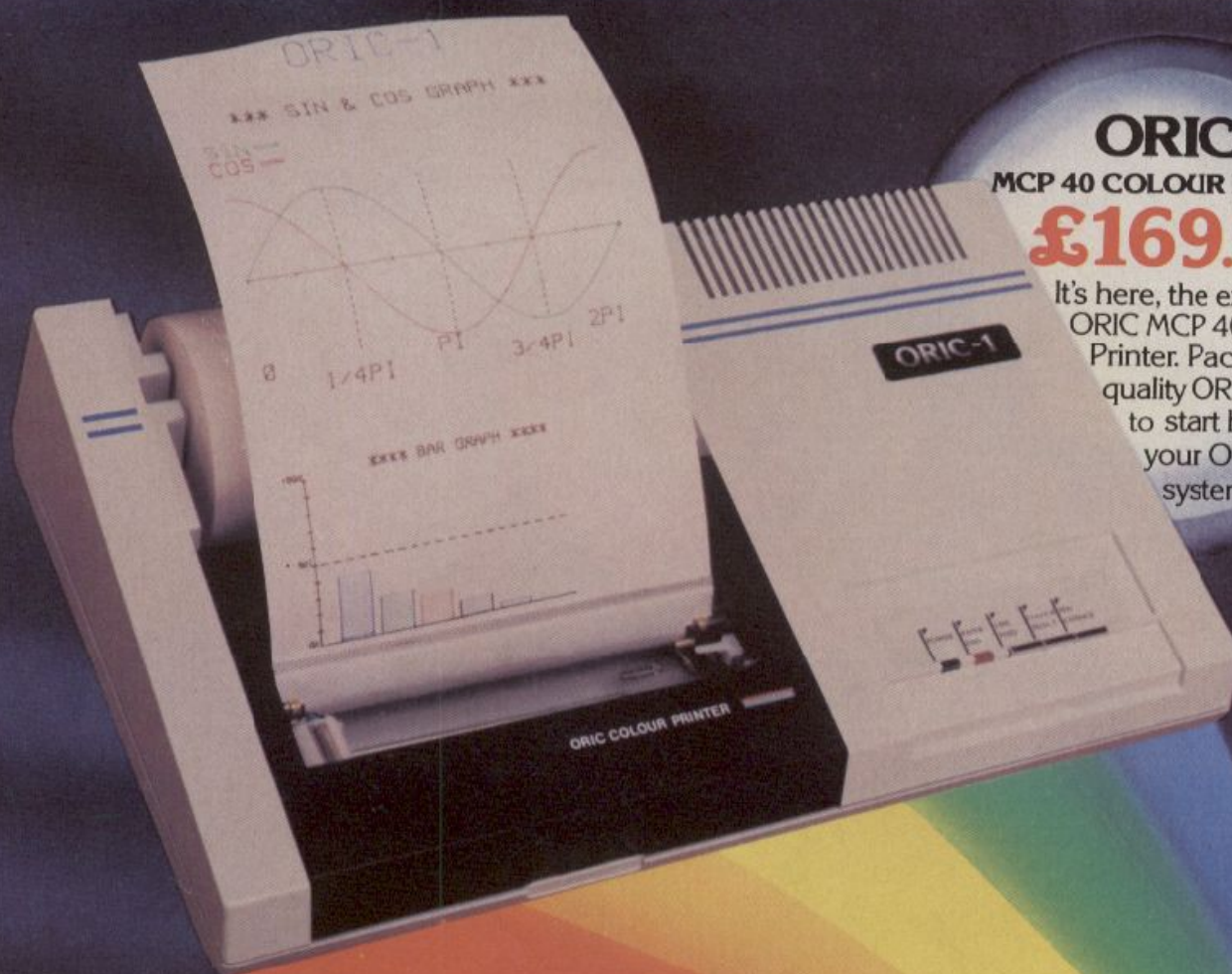
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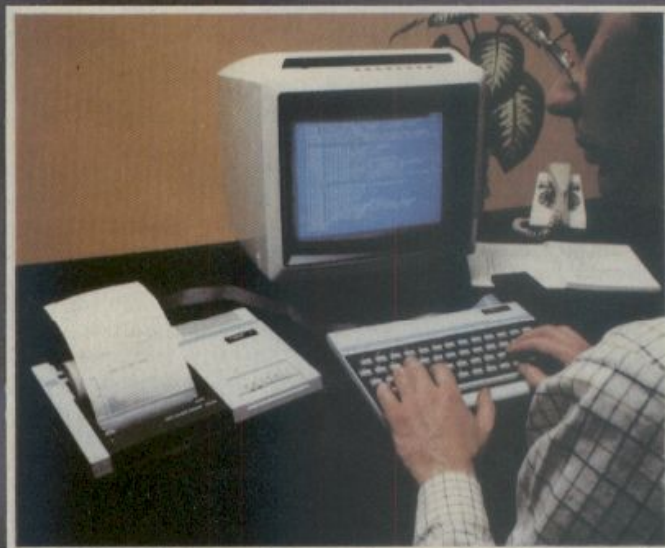
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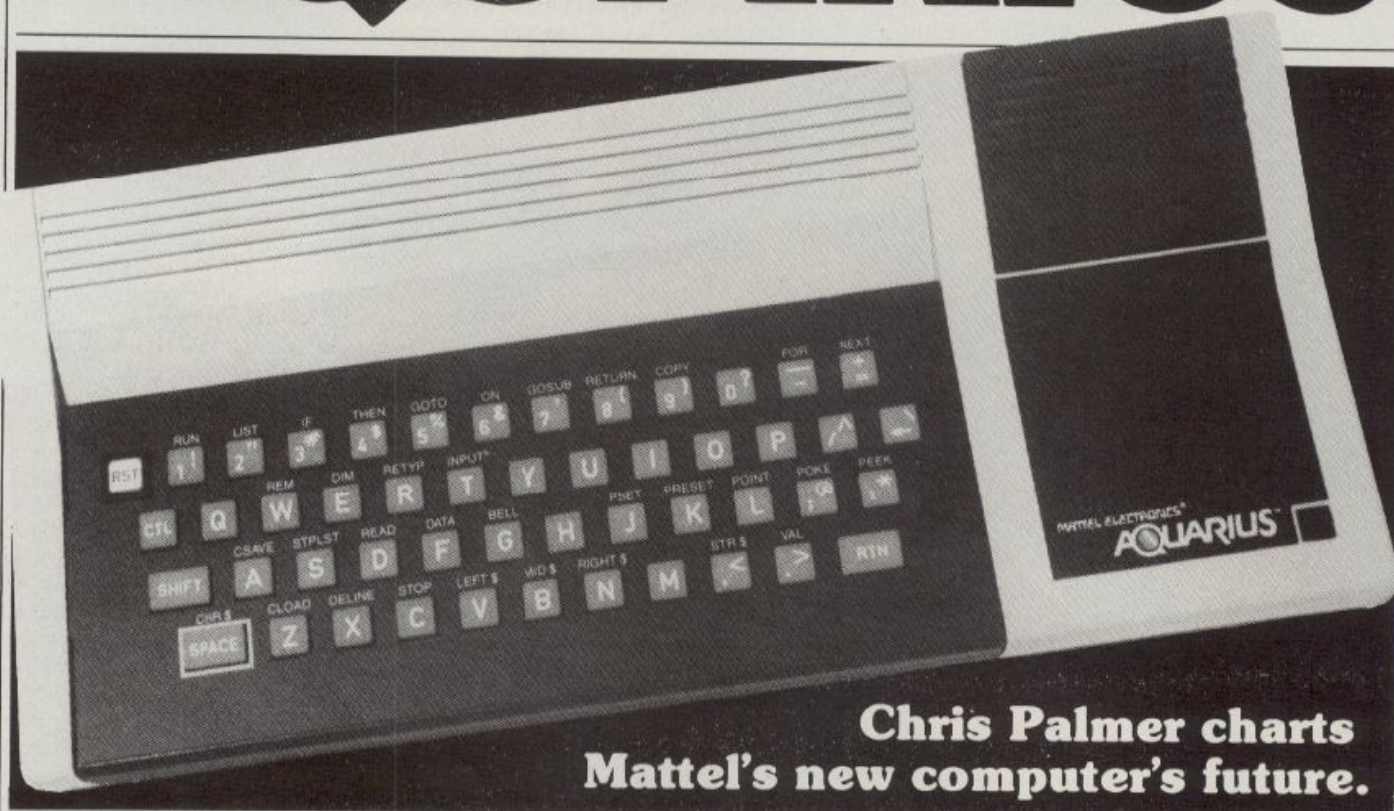
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AQUARIUS



**Chris Palmer charts
Mattel's new computer's future.**

Until recently, the design and manufacture of home computers has been the domain of those companies whose roots lay in the electronics industry. The past year has seen an increase in interest from larger companies who have previously only dabbled with simple electronic games. First on the scene was the Mettoy sponsored Dragon 32 and following close on their heels is the subject of our review — Mattel Electronic's Aquarius.

Prior to the launch of the Aquarius, Mattel had made their name as one of the leading manufacturers of action toys. Their first serious dabblings with computer-style electronics resulted with the much acclaimed Intellelevision games machine. Whilst there was a lot of talk about providing a keyboard for the Intellelevision which would convert it into a computer this now looks unlikely with the arrival of the Aquarius.

Right. Enough of the history lesson, lets look at the Aquarius. The first thing that strikes you on

seeing the Aquarius is that the packaging is of a high standard. The outer box sports full colour pictures and graphics along with lists of all the add-ons. This is obviously designed to sell the computer without you even opening the box.

The box contains the computer, power supply, keyboard overlay, instruction manual, instruction cards, 10ft television cable and one of those switchboxes which lets you plug both the computer and the aerial into the television and switch between them. All you need to do is supply a mains plug and you are ready to start.

Despite adverse comments from some colleagues, I quite liked the styling of the Aquarius. Its angled back and two tone colour scheme apply a stylish yet rugged appearance. Around the back you have sockets for connecting the printer, cassette and television. There is also a channel selector, but seeing as this is only needed for American TVs the switch is not present on the UK models.

The expansion cartridge slot is incorporated into the right side of the computer. When not in use the slot is protected from dirt and grime by a removeable cover. It's a nice idea and one which should be implemented on other computers that have expansion sockets. One small problem was that after a few removals it became loose which meant that more often than not the Aquarius was left without a cover.

Into the expansion socket can be fitted either program ROM cartridges or memory RAM cartridges. These are constructed to the same high degree as the rest of the unit and fit flush, preserving the unit's neat appearance. Because they literally become part of the computer when fitted I cannot foresee any problems of the 'wobbly RAM pack' type which plague other computers of this price.

Now for the bad news, Mattel have opted for a rubber keyboard on the Aquarius. Admittedly it is one of the better rubber keyboards I have tried, but in no way does it measure

up to a proper typewriter keyboard for speed and ease of use. This coupled with a touch of keyboard bounce make entering code or data from the keyboard a bit of a chore.

The keyboard is laid out in standard QWERTY fashion. The only diversions from normal are the lack of a space bar, which is replaced by a space key positioned where you would expect to find the left shift key and the movement of the RETURN key to the position usually occupied by the right shift key. A reset key is also provided and this is situated out of harms way at the top-left end of the keyboard. If your fingers should accidentally stray to the reset key extra safety is provided by a ridge around the key.

Provided with the computer is a keyboard overlay. This plastic sheet fits neatly over the keyboard and is held securely by two plastic tabs at the side. On this overlay is printed a selection of keywords and commands which can be accessed by using the appropriate key in conjunction with the control key. While not all the commands are present on the overlay you do get the ones most often used. The two game cartridges we had with the machine also included their own overlays for both keyboard and controller to indicate which keys are used in the control of the game.

Turning On

On now to the actual operation of the Aquarius. On powering up, the screen displays the message 'BASIC — Press RETURN key to start'. Pressing the RETURN key clears the screen and displays the copyright notice from Microsoft, for it is their BASIC that the machine uses. Following this comes the Aquarius OK prompt and a solid black cursor.

The BASIC is a plain and simple version of standard Microsoft. In fact it has a lot of similarities to Level II Tandy BASIC. The most glaring omission is total lack of any command to let you clear the screen. If you want to clear the screen you have to resort to printing CHR\$(11). On a machine with the rubber keyboard the last thing you want is to cause more typing than is necessary.

Having recovered from that minor irritation I ran straight into one of the Aquarius's larger drawbacks. The problem here is editing, or rather, lack of editing. To say that the Aquarius possesses editing facilities is really stretching

the definition to its limits. You have a delete key which can be used in immediate and program mode to delete one character at a time. If you are in the middle of a line and you decide that you don't want that line you can type 'CTL X' and this will abort that line. You are also given a RETYP command which will prompt you again with the current line number. If, however, you want to edit a line which is already in the computer's memory you're out of luck.

The Aquarius offers no facilities for inserting characters or deleting characters in a line which you have previously typed. The manual offers the following advice: 'If you want to make a change AFTER you press RTN, simply re-type the line.' Obviously the people who put together the Aquarius want you to get lots of practice typing on that lovely rubber keyboard!!!

Graphics and Sound

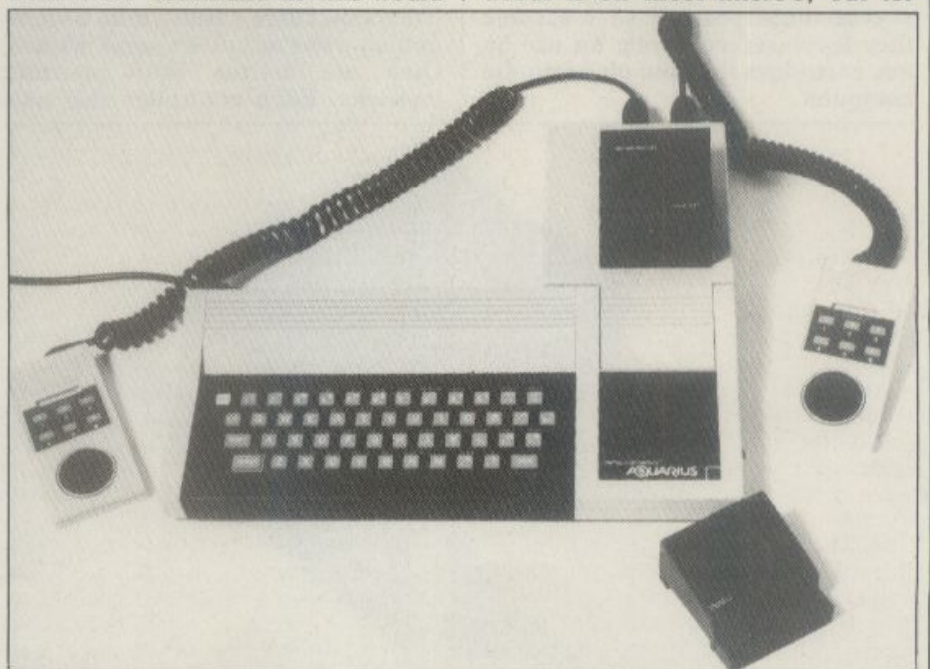
For a computer which is going to have to compete with the Oric and Spectrum for a place in the homes of Britain, the Aquarius doesn't have a lot going for it in terms of graphics, sound and colour. First the good news. The Aquarius contains a good set of pre-defined characters. These can be accessed by printing them using CHR\$() or by POKEing them to the screen. The character set includes several small men in different positions, as well as spaceships and aircraft. I was surprised to find no PRINT AT command as this would

have complemented the graphics well and would also have made life easier for the beginner. As it is, if you want to place something on the screen outside of a normal PRINT, you have to resort to POKEing it there.

POKEing is something that the Aquarius owner is going to have to do a lot of if he wants to write colourful programs. This is because the Aquarius contains no commands to manipulate colour on the screen. To expand a little, the screen on the Aquarius is serviced by two areas of memory. One of these contains the information for which character is to be displayed at a particular position, the other contains the information relating to the colour of that character. The process for placing a character in a certain area of the screen is as follows.

Decide where you want the character and what colour you want it to be. Using the screen memory map in the manual decide on which memory location corresponds to that position on the screen. POKE the code for that character into the memory. Use the formula given in the manual to calculate the required foreground and background colour for your character. Finally work out the corresponding position in the colour memory and POKE the colour into it. If you want to place a string of characters in colour on the screen then you have to start looping.

This system is alright for games because this is the way you would go about it on most micro's, but for



AQUARIUS

anything else it is an unnecessary chore. Admittedly, the Aquarius does offer a larger range of colours than most comparable computers, but when it is so difficult to access them it hardly seems worth it. If you wanted to change the background colour of the screen you have to, from BASIC, POKE each position of the colour memory with the new value for your background colour.

The high resolution graphics facilities on the Aquarius are also quite limited. To start with you only have a screen resolution of 80×72 . To access this you have just three commands — PSET, PRESET and POINT. PSET turns on a block on the screen, PRESET resets it and POINT tests to see whether a block has been set. Once again you have to POKE any colour you want directly into the colour memory, having calculated the position of the block. These sort of archaic graphics were restrictive back in the days of the TRS-80 computer and have no place on current generation machines.

The sound capabilities are basic as well. You get a single sound command with two parameters — tone and duration. This works acceptably except for the fact that the duration increases as the note gets lower, so once again you have to resort to writing little formulae to maintain a constant duration whatever the pitch. One interesting point here is that the specification for the mini expander which can be fitted to the Aquarius says that the expander provides another two sound channels. Nowhere in the documentation does it say how you are supposed to access these yourself so I assume they are reserved purely for use by any cartridges that you plug into the computer.

Peripherals

Having arrived at the subject of peripherals for the Aquarius, things start to look up. It looks like the Aquarius will be well supported when it arrives in the shops. Memory expansion is available in the form of 4K and 16K RAM packs. These can be plugged into either the expansion unit or directly into the computer. The Aquarius is one of those machines which demands extra memory from the start. The standard computer contains 4K of memory, but after the operating system has taken memory for its own workings and for the screen and colour memory you are left with just 1731 bytes for your own programs.

Another peripheral which will be an obvious first choice is the Mini Expander. This chassis fits into the expansion port on the Aquarius. It provides one cartridge slot for extra memory and one for ROM based program cartridges. A nice feature of this unit is that both cartridge ports are fitted with spring loaded doors. These move out of the way when a cartridge is inserted and spring back into place when the cartridge is removed, effectively protecting the sockets from the ravishes of the outside world.

At the back of the Mini Expander are sockets which allow the two games controllers to be fitted. These controllers come supplied with the Mini Expander and are an upgraded version of the Intellevision controllers. Instead of opting for the more usual joystick control, Mattel have decided to stick with their 'Direction Discs'. These take a bit of getting used to but on some games they are better than normal joysticks. Each controller also has

six buttons which can be used for various functions within a game. Once again there was no mention made in any of the manuals as to how you could access these controllers yourself for use in your own programs.

Mattel are also producing a printer for use with the Aquarius. It is capable of producing text, graphics or both. It can be accessed from within programs by the LPRINT or COPY statements. The latter enabling you to make a direct copy of the screen.

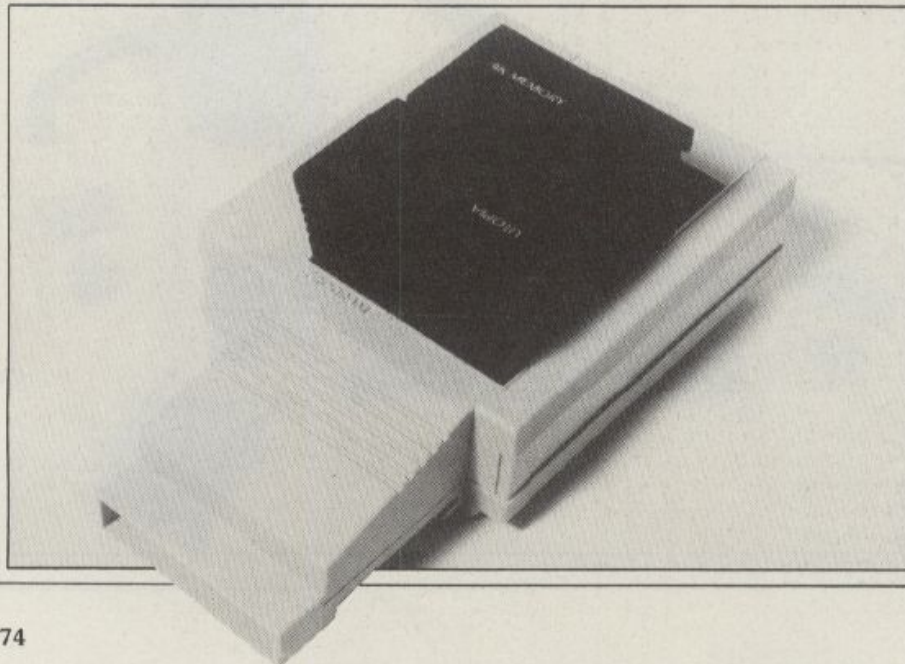
Other expansions that will be available for the Aquarius include a Data Recorder, a Modem cartridge for communications and a master expansion module which will allow the use of discs and the CP/M operating system. At the time of writing no prices had been set for any of these peripherals and all that could be said about the price of the Aquarius was that it was going to be under £100.

Software

At the moment all the software for the Aquarius is being produced by Mattel and will be available on cartridge. Titles will include the children graphic language LOGO and Extended Microsoft BASIC. This BASIC looks as if it might rectify some of the omissions I have mentioned in the standard BASIC, but this remains to be seen.

On the game front a lot of the software has been uprated from Intellevision versions. Titles include the Tron game, Deadly Discs, Snafu, Astrosmash and Burgertime. The latter is a rather intriguing game in which you have to make hamburgers while being menaced by hot dogs and pickles!

To round up, I must say I was disappointed with the Aquarius. I cannot see it competing with the Spectrum or even the Oric as a programmers machine. Like the TI 99/4a it really comes into its own when being used with pre-programmed cartridges be they games or business packs. If you are looking for a machine to explore the delights and frustrations of programming then you could do better than the Aquarius. You will find it is not capable of handling/producing complex programs. However, if you are looking for a computer to use in the passive sense than it might be worth your while checking out the Aquarius.



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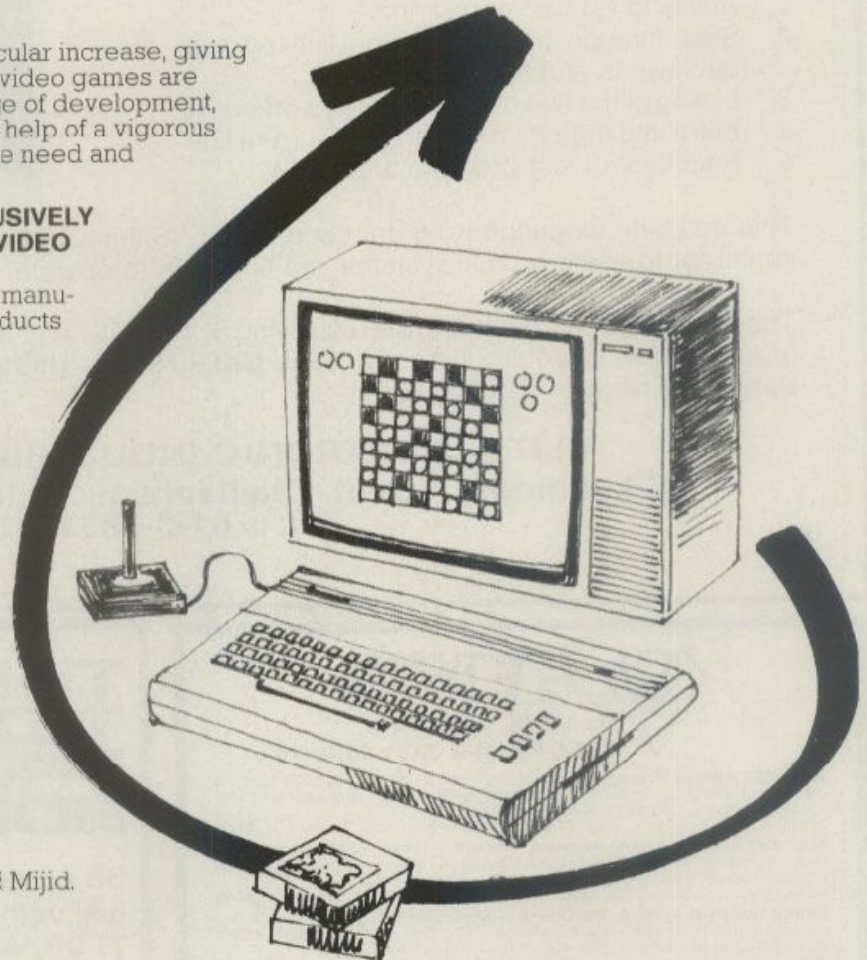
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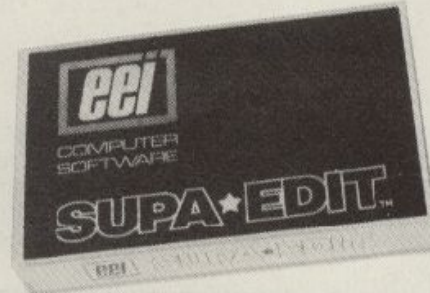
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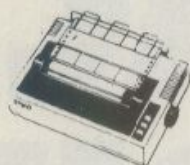
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CHARACTER BUILDING

Steve Dawson's comprehensive program to utilise the BBC Microcomputer's character definition facility to the fullest will vastly improve your programs



The design of custom characters for use in programs can be quite a laborious task using pen and paper. Not any more though because this program makes the task much easier. It will display the VDU statement required to produce the character which has been created. One further feature is that the characters defined by VDU 23 statements in published listings may be input directly and displayed on

the screen to be altered or saved as required. The characters defined may be saved as a database on tape in order that they may be used for future programs.

Getting Started

The program will run on a Model A or B machine with 32K RAM, MODE 1 being used for the screen display.

When the program is run, an 8x8 grid is presented on the screen and the ASCII codes 224-255 (user definable with O.S. 0.1) are printed out together with any characters which have already been defined. The program is menu driven with the following choices: -

- 1... Define character
- 2... Print VDU 23 string
- 3... Input VDU 23 string
- 4... End program

HINTS ON CONVERSION

The program contains several commands which are unique to BBC BASIC.

Procedures

These can usually be replaced by GOSUB except that the variables in brackets after the procedure definition statement are local variables and are not recognised outside the procedure.

Modes

MODE 1 and MODE 7 are used. MODE 7 is the teletext mode, text only with screen size of 40 x 25. In this mode, the colour and appearance of the text are changed with the following VDU codes.

VDU130
VDU131
VDU133
VDU136
VDU141

Gives green text

Gives yellow text

Gives magenta text

Gives flashing text

Gives double height letters

MODE 1 is a high resolution mode with graphics screen size of 320 x 256. It supports text having a screen size of 40 x 32. 4 colours are permissible in this mode. The colours used in this program are the logical colours 0 to 3 i.e. black, red, yellow

VDU5 and VDU4

VDU7
VDU11

VDU12
VDU23

and white respectively. The COLOUR command changes the text colour and is followed by the logical colour to be used. The GCOL 0,C statement changes the graphics colour to logical colour C. Other commands which may cause problems are:- These join and separate the graphics and text cursors. Thus, after the VDU5 statement, text may be printed at the graphics cursor within the graphics window, the position being determined by the MOVE command, with the top left hand corner of the text character being at any point on a 1280 x 1024 grid. Causes a short beep from the loudspeaker Moves the cursor to the start of the current line Clears the screen This is used to define the ASCII character (224-255) whose code is the number following the 23. The character is an 8x8 grid whose Nth row is a representation in binary of the Nth number following the

Full instructions are included within the program and the character design itself is very easy to accomplish. Crosshairs are moved around the 8x8 grid using the cursor keys. The square under the crosshairs may be filled or cleared by pressing F or C respectively. In a small box under the main grid the character is displayed 'actual size' as it is produced. Once the character has been completed,

pressing E (End) will commit the character to memory and proceed with the program.

When the end program is selected from the menu, the newly defined characters are saved on tape for future use.

Saving The Data

Before the program can be run, a database must be created. To

do this SAVE the program as normal and then the following should be entered in command mode i.e. without line numbers: -

```
FOR I=0 TO 256:?(&C00+I)=0:NEXT
```

This empty database should now be recorded straight after the main program using the command: -

```
*SAVE"DATA-1" C00 D00
```

To run the program enter: -
CHAIN""

HOW IT RUNS

10-30	Print introduction	600-640	Displays the character on the 8x8 grid
40	Load database	650-670	Plots or unplots the individual squares within the 8x8 grid
50-70	Set up screen display, present menu	680-700	Prints the character in the small box under the 8x8 grid
80	Change order of program execution depending upon option selected	710-760	Accepts the input of a VDU 23 string from the keyboard, displays the character on the grid and actual size
90-110	Executed for option 3; input the character string	710-810	Called whenever a yes or no answer is required
120-250	Executed for option 1 and option 3 if the character is to be altered	820-840	Plots the crosshairs
130	Set cursor keys to produce ASCII codes	850-900	Fills or clears an individual square of the grid, alters the code in memory and replots the crosshairs
150	Plot crosshairs and character	910-940	POKES the new data into the relevant area of memory
160	Clear all internal buffers	950-1010	Alters the X and Y coordinates for the crosshairs if the cursor keys have been used
170-230	Check for key pressed. Call appropriate procedures to fill or clear squares or to move crosshairs	1020-1050	Outputs the VDU 23 string of a character
240	Put character code into memory	1060-1100	Delays program operation until the space bar is pressed (MODE 1)
250	Executed for option 2 and option 1 if the VDU string is required	1110-1150	Finishing procedure. Saves the new database
260-290	Executed for option 4 to end the program	1160-1420	Prints instructions
300-350	Plots 8x8 grid and small box under the grid to hold the character being worked on	1430-1460	Delays program operation until the space bar is pressed (MODE 7)
360-410	Sets up the codes 224 to 255 together with any characters which may have already been defined	1470-1530	Program introduction
420-450	Displays the menu	1540-1600	Loads data base
460-490	Checks the validity of input data		
500-520	Causes a delay		
530-560	Inputs the ASCII code of the character to be worked on		
570-590	PEEKs the data from memory for the character selected		

VDU24	code.	?(expression) = X	POKES the value of variable X into the memory location given by the expression
VDU28	Defines graphics window	X = ?(expression)	PEEKs the memory location given by the expression and returns its contents to the variable X
VDU31,X,Y	Defines a text window		
PLOT6,X,Y	This is identical to the usual TAB(X,Y) command	&C00-&D00	The & symbol indicates that the number which follows is in hexadecimal. The area of memory &C00 to &D00 is reserved for user defined character definitions
PLOT85,X,Y	Draws to the point X,Y from the last point visited in the logical inverse colour. i.e. draws black on white or white on black	*FX4,1	This enables the cursor keys to produce ASCII codes (136-139)
PLOT87,X,Y	Draws and fills a triangle (in the current graphics foreground colour) made up of point X,Y and the last two points visited	*FX4,0	Returns the cursor keys to their normal editing duties
CLS	As for PLOT85 but the colour used is the current graphics background colour i.e. it effectively 'unplots' a triangle	*FX15,0	Flushes all internal buffers
CHR\$(127)	Clears the text window	*SAVE"name"	Saves the area of memory between &C00 and D00 on cassette. The file is then called 'name'
CHR\$(11)	Moves the text cursor back one character and deletes the character at that position	C00 D00	
SPC(X)	Same as VDU11	LOAD"name" C00	Loads the file called 'name' back into memory beginning at location &C00
TIME = 0	Puts X spaces into the PRINT statement	CHAIN"name"	Loads and runs the program called 'name'
DIV	Sets the internal timer to zero. This increments in 1/100ths of a second	Logical operators	These return the values TRUE or FALSE. These have the numeric values -1 and 0 respectively.
MOD	Integer division		
	Returns the remainder after integer division		

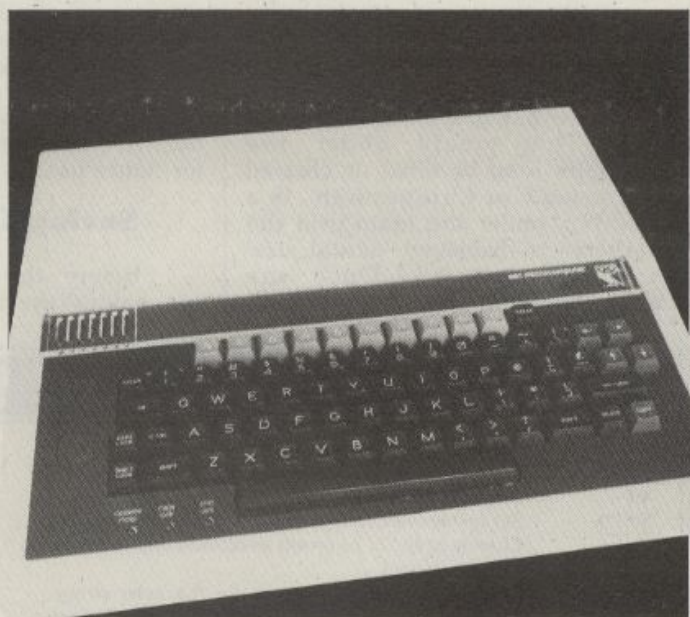
CHARACTER BUILDING

Variables Used

ANS\$	Holds Yes or No in answer to a question
bit	Holds one of the eight bytes which make up the character definition
C	C can take the value 0 or 1. C=0 indicates that the input is within the required range and thus valid. C=1 rejects the input
check	Made equal to the variable to be validated by PROC-check
chr	ASCII code of the character being generated
GRID(8,8)	This array refers to the 8x8 grid. It holds 1 for a filled square or 0 for a cleared square
M	Returns the total of the binary equivalent of one line of the character
MEM(8)	This array holds the 8 bytes of the character code
move	Variable to show which key has been pressed. C(clear;67), F(fill;70) or E(end;69). Will also accept c(99), f(102) or e(101). Cursor keys (136-139)
opt	Takes the value 1-4 depending on the menu option selected
X	X coordinate of crosshairs
Y	Y coordinate of crosshairs

Local variables

CHAR	Points to the correct area of memory to place the data for a character whose VDU23 string is input from the keyboard
CHR	Points to the correct area of memory to find



factor	the data for the character chr
high	Holds 85 to fill a square or 87 to clear it
low	Highest number in the valid input range
period	Lowest number in the valid input range
	Set in 100ths of a second for the internal timer
x,y	Coordinates of the square to be filled or cleared
z	Holds 1 to fill a square or 0 to clear it

PROGRAM LISTING

```

10REM VDU23 DESIGN by S.M.Dawson.
20ON ERROR GOTO280
30MODE7:PROC_intro
40PROC_load
50MODE1:DIM GRID(8,8),MEM(8)
60PROC_grid
70PROC_codes:PROC_menu:IF opt=4 THEN GOTO80 ELSE P
ROC_character:PROC_string(chr):PROC_display:PROC_look

80ON opt GOTO 120,250,90,260
90PROC_instring(chr):COLOUR2
100PRINTTAB(0,27);"Do you wish to alter the charact
er (Y/N)":PROC_answer
110IF ANS$="No" THEN GOTO 70
120X=108:Y=888
130*FX4,1
140REPEAT
150PROC_xhair:PROC_look
160*FX15,0
170VDU7:PRINT"COMMAND ":REPEAT move=INKEY(0):UNTIL
move>0:VDU11
180IF NOT((move<71 AND move>68) OR (move<103 AND mo
ve>100) OR (move<140 AND move>135) OR move=67 OR move
=99) THEN 160
190IF move=70 OR move=102 THEN PROC_fill(85):ELSE I
F move<100 AND move<69 THEN PROC_fill(87)
200PROC_move
210UNTIL move=69 OR move=101
220PRINTTAB(0,27);"Do you want the VDU23 string (Y/
N)":PROC_answer
230IF ANS$="No" THEN GOTO70
240PROC_string(chr)
250PROC_outstring:GOTO70
260PROC_finish:MODE7
270PRINT"PROGRAM TERMINATED.":VDU7,7,7,7
280*FX4,0
290END
300DEFPROC_grid
310VDU24,0,288,1279,1023,28,0,31,39,23:GCOL0,1
320MOVE60,420:DRAW60,940:DRAW80,920:PLOT85,60,420:P

```

```

LOT85,80,440:PLOT85,580,420:PLOT85,560,440:PLOT85,580
,940:PLOT85,560,920:PLOT85,60,940:PLOT85,80,920
330GCOL0,2:FORI=1TO7:MOVE80+I*60,916:DRAW80+I*60,44
4:MOVE84,440+I*60:DRAW556,440+I*60:NEXT
340GCOL0,1:MOVE80,400:DRAW144,400:DRAW144,336:DRAW8
0,336:DRAW60,400
350ENDPROC
360DEFPROC_codes
370GCOL0,3:VDU5
380FORI=1TO16:MOVE544,960-I*32:PRINT(I+223);" ";CH
R$(127+CHR$(I+223));" ";(I+239);" ";CHR$(127+CHR$(I+
239)):NEXT
390MOVE200,384:PRINT"CHR$="
400MOVE928,384:PRINT"C=Clear":MOVE928,352:PRINT"F=F
ill":MOVE928,320:PRINT"E=End":VDU4
410ENDPROC
420DEFPROC_menu
430COLOUR2:PRINT"SELECT OPTION""1....Define chara
cter""2....Print VDU23 string""3....Input VDU23 str
ing""4....End program":VDU7
440REPEAT:INPUT"OPTION (1-4)",opt:check=opt:PROC_ch
eck(1,4):UNTIL C=0:CLS
450ENDPROC
460DEFPROC_check(low,high)
470C=0:IF check >=low AND check <=high THEN ENDPROC
480PRINTCHR$(11);SPC(20):COLOUR1:PRINTCHR$(11);"ILLEGAL
ENTRY":VDU7,7:PROC_delay(150):COLOUR3:PRINTCHR$(11);SP
C(20):C=1:PRINTCHR$(11);CHR$(11)
490ENDPROC
500DEFPROC_delay(period)
510TIME=0:REPEAT UNTIL TIME >period
520ENDPROC
530DEFPROC_character
540COLOUR3:REPEAT:PRINTTAB(0,30);"CHR$ (224-255)= "
:VDU7
550INPUT chr:check=chr:PROC_check(224,255):UNTIL C=
0:CLS
560ENDPROC
570DEFPROC_string(CHR)
580CHR=(CHR-224)*6+&C00:FORI=0TO7:MEM(I+1)=?(CHR+I)

```


PROGRAM LISTING

```

: NEXT
590 DEFPROC
600 DEFPROC display
610 FOR I=8 TO 1 STEP -1: bit=MEM(9-I): FOR J=8 TO 1 STEP -1: G
RID(J,I)=bit MOD 2
620 IF GRID(J,I)=1 THEN PROC_plot(J,I,1): ELSE PROC_p
lot(J,I,0)
630 bit=bit DIV 2: NEXT: NEXT
640 DEFPROC
650 DEFPROC_plot(x,y,z)
660 GCOL0,3: MOVE x*60+24,y*60+384: MOVE x*60+76,y*60+38
4: PLOT 85-2*(z=0),x*60+24,y*60+436: PLOT 85-2*(z=0),x*60
+76,y*60+436
670 DEFPROC
680 DEFPROC_look
690 GCOL0,2: VDU5: MOVE 96,384: PRINT " "; CHR$127: MOVE 96,
384: PRINT CHR$(chr): MOVE 400,384: PRINT " "; CHR$127: CHR
$127: CHR$127: chr: VDU4
700 DEFPROC
710 DEFPROC_instring(CHAR)
720 COLOUR2: PRINT TAB(0,27); "Input the 8 VDU bytes on
e at a time"
730 FOR I=1 TO 8: VDU7: PRINT "Byte "; I: REPEAT INPUT MEM(
I): check=MEM(I): PROC_check(0,255): UNTIL C=0: VDU11: PRI
NTSPC(12): VDU11: NEXT: CLS
740 CHAR=(CHAR-224)*8+60: FOR I=0 TO 7: ?(CHAR+I)=MEM(I
): NEXT
750 PROC display: PROC_look
760 DEFPROC
770 DEFPROC_answer
780 VDU7: REPEAT ANS$=GET$: UNTIL ANS$="Y" OR ANS$="y"
OR ANS$="N" OR ANS$="n"
790 IF ANS$="Y" OR ANS$="y" THEN ANS$="Yes" ELSE ANS
$="No"
800 PRINT ANS$: PROC_delay(150): CLS
810 DEFPROC
820 DEFPROC_xhair
830 MOVE X-12,Y: PLOT 6,X+12,Y: MOVE X,Y-12: PLOT 6,X,Y+12
840 DEFPROC
850 DEFPROC_fill(factor)
860 GCOL0,3
870 MOVE X-24,Y-24: MOVE X+28,Y-24: PLOT factor,X-24,Y+28
: PLOT factor,X+28,Y+28
880 GRID(INT((X-108)/60)+1,INT((Y-468)/60)+1)--1
*(factor=85)
890 PROC memplace: PROC_xhair
900 DEFPROC
910 DEFPROC_memplace
920 M=0: I=INT((Y-468)/60)+1: FOR J=8 TO 1 STEP -1: M=GRI
D(J,I)*(2^(8-J))+M: NEXT: I=8-I
930 ?(chr-224)*6+60+I)=M: PROC_look
940 DEFPROC
950 DEFPROC_move
960 PROC_xhair
970 X=X+60*(move=136)-60*(move=137)
980 IF X<110 THEN X=110 ELSE IF X>530 THEN X=530
990 Y=Y+60*(move=138)-60*(move=139)
1000 IF Y<470 THEN Y=470 ELSE IF Y>890 THEN Y=890
1010 DEFPROC
1020 DEFPROC_outstring
1030 COLOUR2: PRINT TAB(0,27); "The VDU string is : " : C
OLOUR1: PRINT "VDU23,"; chr;
1040 FOR I=1 TO 8: PRINT " "; MEM(I); : NEXT: PRINT " ": PROC_con
tinue
1050 DEFPROC
1060 DEFPROC_continue
1070 COLOUR2: VDU7
1080 PRINT TAB(0,30); "<PRESS SPACE BAR TO CONTINUE>"
1090 REPEAT UNTIL GET=32: CLS
1100 DEFPROC
1110 DEFPROC_finish
1120 COLOUR1: PRINT TAB(0,25); "Insert blank cassette in
to recorder in " "order to save new database.": COLOUR2
: VDU7,7
1130 *SAVE"DATA 1" C00 D00
1140 COLOUR1: PRINT TAB(0,30); "Database recorded.": VDU7
,7: PROC_delay(200): VDU12
1150 DEFPROC
1160 DEFPROC_instruct
1170 VDU131: PRINT "This program will allow you to defi
ne"
1180 VDU131: PRINT "the characters 224 to 255 and save
the"

```

```

1190 VDU131: PRINT "results on tape."
1200 VDU131: PRINT "When the program is loaded initiall
y"
1210 VDU131: PRINT "all the characters will be blank th
us"
1220 VDU131: PRINT "allowing you to build up a data bas
e"
1230 VDU131: PRINT " _ or data bases _ of useful defined
"
1240 VDU131: PRINT "characters."
1250 VDU131: PRINT "Alternatively, a VDU23 string may b
e"
1260 VDU131: PRINT "input directly and the resulting"
1270 VDU131: PRINT "character will be displayed on the"
1280 VDU131: PRINT "screen. This may then be altered o
r"
1290 VDU131: PRINT "saved as you wish."
1300 VDU131: PRINT "For all options, whenever an input"
1310 VDU131: PRINT "is required, a short beep will be"
1320 VDU131: PRINT "heard from the loudspeaker."
1330 PROC_cont
1340 VDU31,2,2,131: PRINT "In order to alter or define
the"
1350 VDU131: PRINT "character presented on the grid, us
e"
1360 VDU131: PRINT "the cursor keys to move the crossha
irs"
1370 VDU131: PRINT "to the correct position and then us
e"
1380 VDU131: PRINT "C....to clear the square"
1390 VDU131: PRINT "F....to fill the square or"
1400 VDU131: PRINT "E....to end"
1410 PROC_cont
1420 DEFPROC
1430 DEFPROC_cont
1440 VDU31,2,23,7,130: PRINT "<Press space bar to conti
nue>"
1450 REPEAT UNTIL GET=32: CLS
1460 DEFPROC
1470 DEFPROC_intro
1480 VDU31,5,10,141,130: PRINT "USER DEFINED GRAPHICS"
1490 VDU31,5,11,141,130: PRINT "USER DEFINED GRAPHICS"
1500 VDU31,2,15,136,133: PRINT "<Turn cassette recorder
off>": VDU7,7
1510 PROC_cont
1520 PRINT "Do you want instructions (Y/N) ?": PROC_ans
wer: IF ANS$="Yes": PROC_instruct
1530 DEFPROC
1540 DEFPROC_load
1550 VDU31,0,14,133: PRINT "Turn cassette recorder on t
o load"
1560 VDU133: PRINT "database.": VDU7,7: PROC_cont
1570 *LOAD"DATA 1" C00
1580 VDU31,7,12,130: PRINT "Database is now loaded."
1590 VDU31,3,17,133: PRINT "<Turn cassette recorder off
>": VDU7,7,7: PROC_cont
1600 DEFPROC
>

```



AGF PROGRAMMABLE JOYSTICK INTERFACE



for

Sinclair ZX Spectrum 81

ABOUT OUR PROGRAMMABLE INTERFACE

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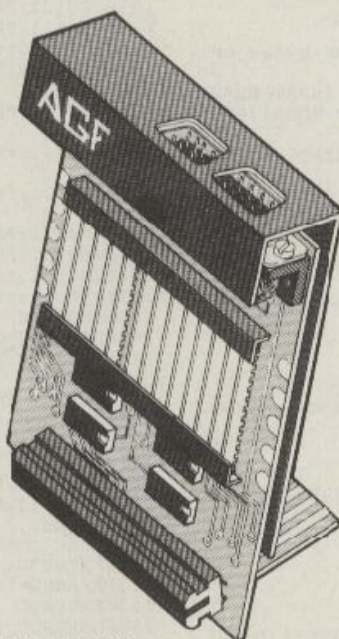
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- ★ Free demo program and instructions.

PACKAGE CONTENTS SUPPLIED

- Programmable Interface Module as illustrated, complete with clip-on programming leads.
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Vulcan Electronics

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Micro Byte

Elephant Software

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Workforce

Peaksoft

Arcadia

Rushton

Jilsoft

Titan

Software Invasion

Cosma

MICRO FACTFILE

Factfile is our regular buyer's guide to microcomputers. Herein you will find all the important facts and figures on 28 of the most important micros on the market under £1000. The idea is that you are able to directly compare what different manufacturers are offering you and how much they are charging you for it. Many brochures and adverts bury the reader in a mass of irrelevant facts and figures, which make it difficult to judge one against the other.

Factfile sorts it all out for you!

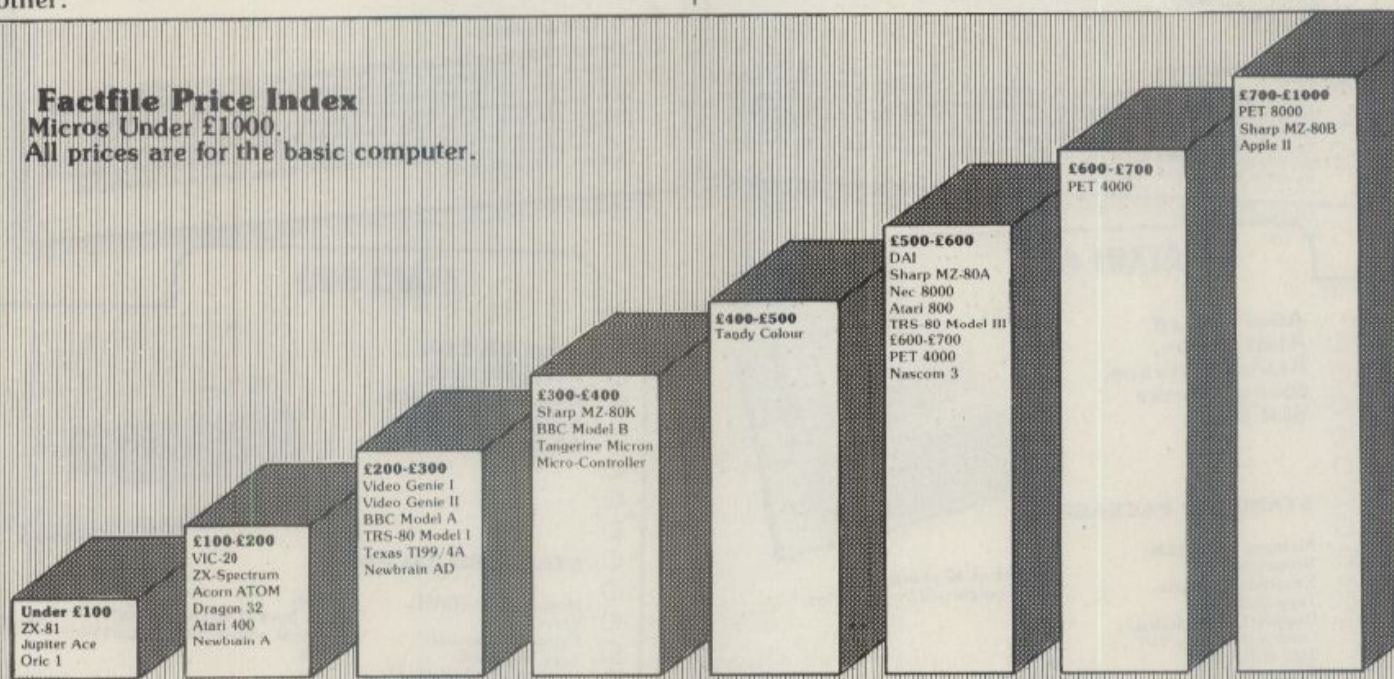
Just look down the price index to discover which machines are in your price-range and then consult the 'cards' on each. All the information is in a standard form and has all been checked by our technical staff. The section is presented alphabetically.

As new machines become available, we will add them into the FACTFILE as soon as we can.

Factfile Price Index

Micros Under £1000.

All prices are for the basic computer.



Factfile

RAM: Stands for Random Access Memory and it is in there to accept the user's programs. Amount of memory is measured in "thousands of bytes" or "K" ie, 8K. A byte is a computer 'word' or single piece of information, made up of eight 'bits' which are just 1 or 0. Hence you need thousands of bytes to store a reasonable size program, since each letter, number, full stop, comma, line number, etc, uses up computer 'words' quite rapidly.

As a guideline - you can get about 50 program lines into 1K and 250 into 8K. This is a rough estimate - don't take it literally! The figures are not straight multiples, because you need to allow the machine space to work on your listing, once you've typed it in.

ROM: Read Only Memory. The machine can look and see what is stored in the memory, but it cannot alter the contents, nor store anything new. Generally used for control programs, where the micro consults the memory to see what to do next at various points in the program. Languages, such as BASIC, are stored in ROM and allow the machine to interpret what you type in, in terms of its own 'machine code'.

SIZE OF BASIC: The number of bytes occupied by the BASIC language is important, as it is an approximate guide to the BASICs versatility. The more powerful the language, the easier it should be to use.

BUS CONNECTION: A socket on the micro which allows it to be linked up to various add-ons. This can take the form of many various items, ie, expansion box, printer, disc drives, plotting device. In short a BUS is an information 'window' through which the micro communicates with the outside world.

SERIAL/PARALLEL OUTPUT: This refers to the manner in which the micro transmits data to other units. If it puts out information in a long string, one bit after another, down a single wire or connector, it is a serial output. Parallel output is where pins or wires carry information simultaneously and are 'read' together as a block by whatever it is the micro is communicating with.

VIDEO OUTPUT: an output which will drive a monitor, as opposed to a TV set, allowing it's use as a screen for the computer.

REFERENCE FACTFILE

ACORN ATOM

Acorn Computers,
4A Market Hill,
Cambridge.
Tel: 0223-245200.



STANDARD PACKAGE

Memory Size (RAM)	2K
Screen Size	16 lines of 32 characters
Expansion Sockets	BUS connector, Printer, Video output
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	£140 kit, £174.50 built

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	12K internal, 32K external options	£45-149
Printer	Yes	£232
Monitor	No	£299
Disc Drives	Yes	£11.50
Other Languages	Yes	
Multi-user	Yes	£50
Capabilities	Yes, BBC BASIC	
BASIC extensions (Toolkits)		

OTHER ADD-ONS:

Centronics-type connector, Technomatic Ltd, 17 Burnley Road, London NW10, £8.50; **TMS 5100 Talking Board**, GM Microtronics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95; **DUO-1 64K add-on**, Audio Computers, 87 Bournemouth Park Road, Southend-on-sea, SS5 2JJ, £64 kit, £70 built; **MZ163 RAM expansion boards**, Timedata Ltd, 57 Swallowdale, Basildon, Essex SS15 5BZ, £59.50-76.

APPLE II

Apple Computer (UK) Ltd,
Finway Road,
Hemel Hempstead,
Herts, HP2 7PS



STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	24 lines of 40 characters
Expansion Sockets	BUS connections
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8 or 12K
Average Price	£812

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	
Printer	Yes various	£200-1700
Monitor	Yes	£134
Disc Drives	Yes	£379
Other Languages	Yes	£84-500
Multi-user	No	
Capabilities	Yes	£26
BASIC extensions (Toolkits)		

OTHER ADD-ONS:

TMS 5100 Talking Board, GM Microtronics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95; **Multifunction Card**, Datex Micros, 193 Touring Road, Worthing, W. Sussex, £85; **5 1/4" Winchester disc drive**, Independent Computer Engineering Ltd 16/18, Littleton Road, Ashford, Middlesex, TW15 1UQ; **16K RAM Board**, DDP Research & Marketing, 17 Novel Square, Basildon, Essex, SS13 1LP, £75; **U-port, 8 serial interfaces**, U-Microcomputers, Ltd, Winstanley Industrial estate, Long Lane, Warrington, Cheshire, WA2 8PR, £195.

ATARI 400

Atari UK Ltd,
Atari House,
Railway Terrace,
Slough, Berks
SL2 5BZ.



STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	24 lines of 40 characters
Expansion Sockets	Serial output, BUS connector
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	£149.99

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	
Printer	Yes	£199.90
Monitor	No	
Disc Drives	Yes	£299.99
Other Languages	Yes	£39.79
Multi-user		
Capabilities	No	
BASIC extensions (Toolkits)	Yes	TBA

OTHER ADD-ONS:

TMS 5100 Talking Board, GM Microtronics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95

ATARI 800

Atari UK Ltd,
Atari House,
Railway Terrace,
Slough, Berks
SL2 5BZ.



STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	24 lines of 40 characters
Expansion Sockets	Serial output, BUS connector
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	£399.95

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	Yes	£199.99
Printer	No	
Monitor	Yes	£299.99
Disc Drives	Yes	£39.79
Other Languages		
Multi-user	No	
Capabilities	Yes	TBA
BASIC extensions (Toolkits)		

OTHER ADD-ONS:

TMS 5100 Talking Board, GM Microtronics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95; **Carrying case**, CJE Microcomputer, 25 Henry Avenue, Rustington W. Sussex, BN16 2PA, £18.50

BBC MICROCOMPUTER

**BBC Model A,
BBC Microcomputer
Systems,
PO Box 7,
London W3 6JX.**



STANDARD PACKAGE

Memory Size (RAM)	16
Screen Size	32 lines of 40 characters (max)
Expansion Sockets	Parallel serial output, analogue output, Bus connection
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	£299

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	up to 32K	£100
Printer	TBA	£200
Monitor	Yes	—
Disc Drives	TBA	—
Other Languages	TBA	—
Multi-user	Yes	—
Capabilities	TBA	—
BASIC extensions (Toolkits)	TBA	—

OTHER ADD-ONS:

Disc drives, single and dual. Cumara Ltd, 35 Walnut Street Close, Guildford, Surrey GU1 4UN, Tel: 0483 50321, £199-799; **BBC Cassette Recorder,** Microage Electronics, 135 Hale Lane, Edgware, Middx, £28; **Colour Monitor,** Portatel Conversions Ltd, 25 Sunbury Cross Centre, Staines Road West, Sunbury-on-Thames, Middx, TW16 7BB, £299; **Floppy Disc Controller Kit,** Midwich Computer Co Ltd, Hewitt House, Northgate Street, Bury St. Edmunds, Suffolk IP33 1HQ, £42.50; **Analogue Joystick, Light Pen,** Sack Computers, 290-298 Derby Road, Bootle, Liverpool.

BBC MICROCOMPUTER

**BBC Model B
BBC Microcomputer
Systems,
PO Box 7,
London W3 6JX**



PACKAGE

Memory Size (RAM)	32
Screen Size	30 lines of 80 characters
Expansion Sockets	Serial and parallel output, analogue output, printer BUS connection
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	£399

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	TBA	—
Monitor	No	TBA
Disc Drives	TBA	—
Other Languages	TBA	TBA
Multi-user	Yes	TBA
Capabilities	Yes	—
BASIC extensions (Toolkits)	TBA	TBA

OTHER ADD-ONS:

Disc drives, single and dual. Cumara Ltd, 35 Walnut Tree Close, Guildford, Surrey GU1 4UN, Tel: 0483 503121, £199-799; **BBC Cassette recorder,** Microage Electronics, 135 Hale Lane, Edgware, Middx, HA8 9QP, £28; **Colour Monitor,** Portatel Conversions Ltd, 25 Sunbury Cross Centre, Staines Road West, Sunbury-on-Thames, Middx, TW16 7BB, £299; **Floppy Disc Controller Kit,** Midwich Computer Co Ltd, Hewitt House, Northgate Street, Bury St. Edmunds, Suffolk, IP33 1HQ, £42.50; **Carrying Case,** CJE Microcomputers, 25 Henry Avenue, Rustington, W. Sussex, BN16 2PA, £18.50.

COMMODORE PET 4000

**Commodore,
675 Ajax Avenue,
Slough, Berks**



STANDARD PACKAGE

Memory Size (RAM)	16 or 32K
Screen Size	25 lines of 40 characters
Expansion Sockets	IEEE 488 standard, parallel output
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	12K
Average Price	£632.50, £799.25

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes several	£454-1604
Monitor	N/A	—
Disc Drives	Yes	£396
Other Languages	Yes, single or dual	£454-1029
Multi-user	Yes	—
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Universal Interface, Technomatic Ltd, 17 Burnley Road, London NW10, £149; **TMS 5100 Talking Board,** GM Microtronics Ltd, Unit 14, Godinton Way Industrial Estate, Ashford, Kent, E82.95; **64K DRC Module,** Audio Computers, 87 Bournemouth Park Road, Southend-on-sea SS5 2JJ, £70 kit, £80 built.

COMMODORE PET 8000

**Commodore,
675 Ajax Avenue,
Slough, Berks**



STANDARD PACKAGE

Memory Size (RAM)	32K or 96K
Screen Size	25 lines of 80 characters
Expansion Sockets	IEEE 488 standard, parallel output
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	12K
Average Price	£980, £1374

MANUFACTURER'S EXPANSIONS

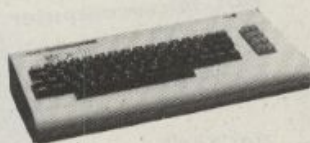
	DETAILS	PRICE
RAM	No	—
Printer	Yes various	£454-1604
Monitor	N/A	—
Disc Drives	Yes single or dual	£454-1029
Other Languages	Yes	—
Multi-user	Yes	—
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Universal Interface, Technomatic Ltd, 17 Bunley Road, London NW10, £149; **TMS 5100 Talking Board,** GM Microtronics Ltd, Unit 14, Godinton Way Industrial Estate, Ashford, Kent, E82.95; **64K DRC Module** Audio Computers, 87 Bournemouth Park Road, Southend-on-sea SS5 2JJ, £70 kit, £80 built.

COMMODORE VIC20

Commodore,
675 Ajax Avenue,
Slough, Berks



STANDARD PACKAGE

Memory Size (RAM)	5K
Screen Size	23 lines of 22 characters
Expansion Sockets	BUS connection, Disc, Printer, Serial output, joystick
Tape Included?	Yes
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	£129.99

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	3K, 8K, 16K expansion options	£30, £45, £75
Printer	Yes	£270
Monitor	No	—
Disc Drives	Yes	£396
Other Languages	Yes	£38.95
Multi-user	No	—
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

VCR-20. 20K RAM cartridge, Audio Computers, 87 Bournemouth Park Road, Southend on Sea SS5 2JJ, £39 kit, £45 built; **Expansion Board,** 3K-16K, Arfon Microelectronics Ltd, Glyn Industrial Estate, Caernafon, Gwynedd, Wales LL55 2BD, £220. Languages VIC Forth, Adda Computers, 154 Victoria Road, Acton, London, W3.

COMMODORE 64

Commodore,
675 Ajax Avenue,
Slough, Berks



STANDARD PACKAGE

Memory Size (RAM)	64K
Screen Size	25 lines of 40 characters
Expansion Sockets	BUS, Serial, Video
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	£350

MANUFACTURER'S EXPANSIONS

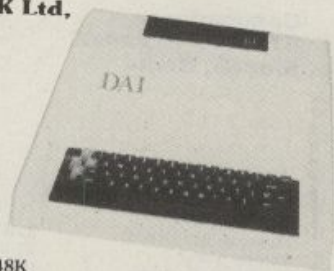
	DETAILS	PRICE
RAM	No	—
Printer	No	—
Monitor	Yes	£230-276
Disc Drives	No	—
Other Languages	Yes	£299
Multi-user	Yes	—
Capabilities	Yes	—
BASIC Extensions	Yes	—

OTHER ADD-ONS:

Light Pen, 4 slot motherboard, Joystick, RS232 Interface, Stack Computers, 290-298 Derby Road, Bootley Liverpool. 051-933 5511.

DAI

Data Applications UK Ltd,
16B Dyer Street,
Cirencester,
Gloucestershire,
GL7 2PF



STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	24 lines of 60 characters
Expansion Sockets	BUS connection, Serial output, joystick socket
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	£575

MANUFACTURER'S EXPANSIONS

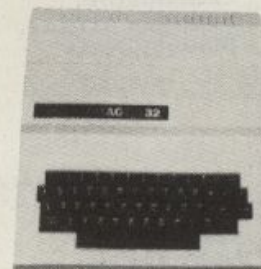
	DETAILS	PRICE
RAM	No	—
Printer	No	—
Monitor	No	—
Disc Drives	Yes	TBA
Other Languages	No	—
Multi-user	No	—
Capabilities	No	—
BASIC extensions (Toolkits)	Yes, maths pack	£149

OTHER ADD-ONS:

None Reported

DRAGON 32

Dragon Data Ltd
Queensway,
Swansea
Industrial Estate,
Swansea, SA5 4EH



STANDARD PACKAGE

Memory Size (RAM)	32K
Screen Size	16 lines of 32 characters
Expansion Sockets	Yes
Display Unit Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	£199

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	—	—
Printer	No	—
Monitor	No	—
Disc Drives	No	—
Other Languages	Yes	—
Multi-user	No	—
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Joystick, Light Pen, 4 slot motherboard, Stack Computers 290-298 Derby Road, Bootle, Liverpool. 051-933 5511.

JUPITER ACE

Jupiter Cantab
22 Foxhollow
Bar Hill
Cambridge
CB3 8EP



STANDARD PACKAGE

Memory Size (RAM)	3K
Screen Size	24 lines of 32 characters
Expansion Sockets	Not known
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	Resident language is FORTH at 8K
Average Price	£89.95

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	TBA	—
Printer	TBA	—
Monitor	TBA	—
Disc Drives	TBA	—
Other Languages	TBA	—
Multi-User Capabilities	TBA	—
BASIC extensions (toolkits)	N/A	—

OTHER ADD-ONS:

None Reported.

NASCOM 3

Lucas Logic, NASCOM
Microcomputers Division,
Welton Road,
Wedgenock Industrial
Estate,
Warwick, CV34 5PZ.
Tel: 0926-497733



STANDARD PACKAGE

Memory Size (RAM)	0-48K
Screen Size	25 lines of 40 or 80 character
Expansion Sockets	Parallel & serial outputs, BUS connections
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8-10K
Average Price	£549

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	up to 48K (max)	£130
Printer	Yes	£215-1285
Monitor	Yes	£99-120
Disc Drives	Yes, single or dual	£470-685
Other Languages	Yes	£50
Multi-user	Yes	—
Capabilities	No	—
BASIC extensions (Toolkits)	Yes	-15-50

OTHER ADD-ONS:

Olivetti disc drives, single and dual, Kram Electronics, Victoria House, 17, Highcross St., Leicester, LE1 4PF, £179.349; **A/D Board,** 10, Research Ltd, 6, Laleham Avenue, Mill Hill, London NW7 3HL, £120 + VAT; **Hobbit - mini-cassette system,** Ikon Computer Products, Kiln Lane, Laugharne, Cwmnathen, Dyfed, £99 + VAT; **Disc drives, single and dual,** Micro-Spares, 19, Roseburn Terrace, Edinburgh, EH12 5N9, £199.279.

NEWBRAIN

Grundy Business Systems Ltd,
Grundy House,
Somerset Road,
Teddington
TW11 8TD.



STANDARD PACKAGE

Memory Size (RAM)	32K
Screen Size	25 lines of 40 or 80 characters
Expansion Sockets	Printer, serial, video, data bus
Tape Included?	No
Display Unit Included?	No (Single line option on model AD)
Usable Domestic TV?	Yes
Size of BASIC	18K
Average Price	£199 model A, £299 Model AD

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	64 - 512K,	£75 - £445
Printer	—	—
Monitor	—	—
Disc Drives	NYA	—
Other Languages	NYA	—
Multi-user	NYA	—
BASIC extensions	NYA	—

OTHER ADD-ONS:

None Reported.

ORIC 1

Oric Products International,
Coworth
Mansion,
Coworth Park,
London Road,
Sunninghill, Ascot,
Berkshire, SL5 7SE.



STANDARD PACKAGE

Memory Size (RAM)	16K, 48K
Screen Size	28 X 40
Expansion Sockets	Yes
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	£99, £169

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	N/A	—
Printer	TBA	—
Monitor	No	—
Disc Drives	TBA	—
Other Languages	N/A	—
Multi-user	—	—
Capabilities	No	—
BASIC extensions	TBA	—

OTHER ADD-ONS:

FACTFILE

SHARP MZ-80A

Sharp UK Ltd,
Thorn Road,
Newton Heath,
Manchester
M10 9BE
Tel: 061-205 2333



STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	25 lines of 40 characters
Expansion Sockets	BUS connector
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	12K
Average Price	£549

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	£450-800
Printer	Yes	—
Monitor	N/A	£600
Disc Drives	Yes, dual	£45
Other Languages	Yes	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:
None Reported

SHARP MZ-80B

Sharp UK Ltd,
Thorn Road,
Newton Heath,
Manchester M10 9BE



STANDARD PACKAGE

Memory Size (RAM)	64K
Screen Size	25 lines of 40 or 80 characters
Expansion Sockets	BUS connector
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	16K
Average Price	£990

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	Yes	£120
Printer	Yes	£450-800
Monitor	N/A	—
Disc Drives	Yes, dual	£600
Other Languages	Yes	£45
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Multi-vision and triple-vision, Datron Micro Centre, 2 Abbeydale Road, Sheffield S7 1FD, £35-79

SHARP MZ-80K

Sharp UK Ltd,
Thorn Road,
Newton Heath,
Manchester
M10 9BE



STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	25 lines of 40 characters
Expansion Sockets	BUS connector
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	12K
Average Price	£350

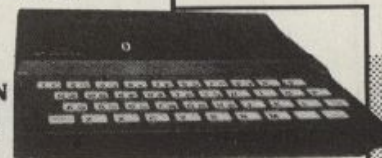
MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes	£450-800
Monitor	N/A	—
Disc Drives	Yes, dual	£600
Other Languages	Yes	£45 upwards
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:
None Reported

SINCLAIR ZX 81

Sinclair Research,
6 Kings Parade,
Cambridge CB2 1SN



STANDARD PACKAGE

Memory Size (RAM)	1K
Screen Size	24 lines of 32 characters
Expansion Sockets	BUS connections
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	£49.95 built

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	16K RAM pack	£29.95
Printer	ZX Printer	£59.95
Monitor	No	—
Disc Drives	No	—
Other Languages	No	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Memory expansion unit 16K or 64K, Memotech Ltd, 3 Collins St, Oxford OX4 1XL, £39.95-79; Memory Expansion 64K, Downsway Electronics (UK) Ltd, Dept M, Downsway House, Epsom Road, Ashted, Surrey, £59.95; Key Bleep Unit, Microtronix, 3 Buxton Avenue, Coulton, Nottingham, N94 3KK, £8.85 kit, £9.95 built; Maximem 1.1, East London Robotics, Finlandia House, 14 Darwell Close, East Ham, London, E84 BT, £93.50; Music Synthesiser + 16 line control port, William Stuart Systems Ltd, Dower House, Billicicay Road, Herongate, Brentwood, Essex CM13 3SD, £19.50; Full-size keyboard, Protos Computer Systems, Frome Computing, 20 Ashtree Road, Frome, Somerset, BA11 2SF, £64.95; ZX99 Automatic tape control, Data-cassette, 44, Shroton Street, London NW1 6UG, £59.95.

SINCLAIR ZX SPECTRUM

**Sinclair Research,
6 Kings Parade,
Cambridge, CB2 1SN**



STANDARD PACKAGE

Memory Size (RAM)	16-48K
Screen Size	24 lines of 32 characters
Expansion Sockets	BUS connections
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	10K
Average Price	£125 or £175

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	48K RAM for 16K version	£60
Printer	ZX Printer	£59.95
Monitor	No	—
Disc Drives	ZX Microdrive	TBA
Other Languages	No	—
Multi-user	No	TBA
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Memory Expansion 32K, Downsley Electronics (UK) Ltd, Dept M, Downsley House, Epsom Road, Ashted, Surrey: £42.50

TANDY TRS 80 I

**Tandy Corporation,
12th Floor,
Tameway Tower,
Walsall,
West Midlands
WS1 1LA.**



STANDARD PACKAGE

Memory Size (RAM)	4 or 16K
Screen Size	16 lines of 32 or 64 characters
Expansion Sockets	BUS connection
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8 or 12K
Average Price	£229 or £339

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	32K extra in expansion unit	£349
Printer	Yes	—
Monitor	Yes	£239-1200
Disc Drives	Yes	£100
Other Languages	Yes	£369
Multi-user	Yes	£100
Capabilities	No	—
BASIC extensions (Toolkits)	Yes	£100

OTHER ADD-ONS:

Disc drives, single and dual, Cumana Ltd, 35 Walnut Tree Close, Guildford, Surrey GU1 4UN, £199.799; **Olivetti disc drives single and dual**, Kram Electronics, Victoria House, 17 Highcross St., Leicester LE1 4PF, £179.349; **48K internal RAM**, General Northern Microcomputers, (GNOMIC) 46 Middle Street, Blackhall, Marlepool, Cleveland, £70 + VAT; **32K RAM card**, Audio Computers, 87 Bournemouth Park Road, Southend on Sea, SS5 2JJ, £40 kit, £46 built.

TANDY TRS 80 III

**Tandy Corporation,
12th Floor,
Tameway Tower,
Bridge Street,
Walsall,
West Midlands,
WS1 1LA**



STANDARD PACKAGE

Memory Size (RAM)	4-48K
Screen Size	16 lines of 32 or 64 characters
Expansion Sockets	BUS connection, parallel & serial output
Tape Included?	No
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	16K
Average Price	£599-1799

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	16K modules	£70
Printer	Yes various	£239-1200
Monitor	N/A	—
Disc Drives	Yes	£600
Other Languages	Yes	£100
Multi-user	No	—
Capabilities	Yes	£100
BASIC extensions (Toolkits)	Yes	£100

OTHER ADD-ONS:

Disc drives, Cumana Ltd, 35, Walnut Tree Close, Guildford, Surrey GU1 4UN, £199.799; **Olivetti disc drives single and dual**, Kram Electronics, Victoria House, 17, Highcross St, Leicester LE1 4PF, £179.349; **48K internal RAM**, General Northern Microcomputers, (GNOMIC), 46 Middle Street, Blackhall, Hartlepool, Cleveland, £70 + VAT; **32K RAM card**, Audio Computers, 87 Bournemouth Park Road, Southend on Sea, SS5 2JJ, £40 kit, £46 built.

TANDY COLOUR

**Tandy Corporation,
12th Floor,
Tameway Tower,
Bridge Street,
Walsall,
West Midlands
WS1 1LA**



STANDARD PACKAGE

Memory Size (RAM)	16-32K
Screen Size	16 lines of 32 characters
Expansion Sockets	Serial output, ROM pack, joystick socket
Tape Included?	No
Display Unit included?	No
Usable Domestic TV?	Yes
Size of BASIC	8-16K
Average Price	£499

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes various	£239-1200
Monitor	No	—
Disc Drives	Yes	£439
Other Languages	No	—
Multi-user	No	—
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

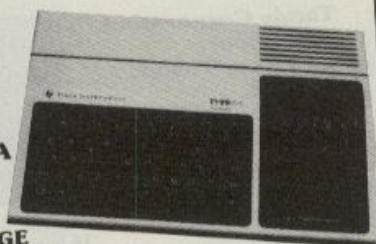
OTHER ADD-ONS:

Olivetti disc drives single and dual, Kram Electronics, Victoria House, 17 Highcross St., Leicester LE1 4PF, £179.349.

FACT FILE

TEXAS TI 99/4A

Texas Instruments,
European
Consumer
Division,
Manton Lane,
Bedford MK41 7PA



STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	24 lines of 32 characters
Expansion Sockets	ROM pack, Bus connector, joystick, socket
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	14K
Average Price	£199

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	up to 48K (max)	£300
Printer	Yes	£275
Monitor	No	—
Disc Drives	Yes	£300
Other Languages	Yes	£50-£100
Multi-user	No	—
Capabilities	No	£100
BASIC extensions (Toolkits)	Yes	—

OTHER ADD-ONS:

Speech Synthesiser, Texas Instruments, £46.60; Terminal Emulator II, Texas Instruments, £37.80; RS232 Interface, Texas Instruments.

COLOUR GENIE

Lowe Computers,
Bentley Bridge,
Chesterfield Road,
Matlock
Derbyshire DE4 5LE
Tel: 0629 4995/4057



STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	24 lines of 40 characters
Expansion Sockets	Parallel & serial output, expansion BUS
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	£194

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	16K	£38.56
Printer	Yes	£220
Monitor	No	—
Disc Drives	No	—
Other Languages	No	—
Multi-user	No	—
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

VIDEO GENIE I

Lowe Electronics,
Bentley Bridge,
Chesterfield Road,
Matlock,
Derbyshire,
DE4 5LE



STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	16 lines of 64 characters
Expansion Sockets	BUS connector
Tape Included?	Yes
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	12K
Average Price	£279

MANUFACTURER'S EXPANSIONS

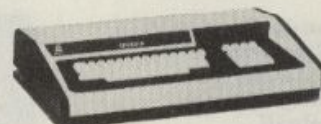
	DETAILS	PRICE
RAM	optional 48K in expansion unit	£200
Printer	Yes	£210
Monitor	Yes	£69.99
Disc Drives	Yes, single and dual	£220-375
Other Languages	No	—
Multi-user	No	—
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Disc drives, single and dual, Cumana Ltd, 35 Walnut Tree Close, Guildford, Surrey GU1 4UN, £199.799; Olivetti disc drives single and dual, Kram Electronics, Victoria House, 17 Highcross St, Leicester LE1 4PF, £179.349; EG3014 Expansion box with 16K/32K RAM, Swanley Electronics, 32 Goldsel Road, Swanley, Kent BR8 8EZ, £199.213; 48K internal RAM, General Northern Microcomputers, GNDMIC, 46 Middle Street, Blackhall, Hartlepool, Cleveland, £70 + VAT; 32K RAM Card Audio Computer, 87 Bournemouth Park Road, Southend-on-sea, SS5 2JJ, £40 kit, £46 built.

VIDEO GENIE II

Lowe Electronics,
Bentley Bridge,
Chesterfield Road,
Matlock,
Derbyshire DE4 5LE



STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	16 lines of 32 or 64 characters
Expansion Sockets	BUS connector
Tape Included?	No
Display Unit Included?	Yes
Usable Domestic TV?	13K
Size of BASIC	£299
Average Price	—

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	optional 48K in expansion unit	£200
Printer	Yes	£210
Monitor	Yes	£69.99
Disc Drives	Yes, single and dual	£220-375
Other Languages	No	—
Multi-user	No	—
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Disc drives, single and dual, Cumana Ltd, 35 Walnut Tree Close, Guildford, Surrey, GU1 4UN, £199.799; Olivetti disc drives single and dual, Kram Electronics, Victoria House, 17 Highcross St, Leicester LE1 4PF, £179.349; EG3014 Expansion box with 16K/32K RAM, Swanley Electronics, 32 Goldsel Road, Swanley, Kent BR8 8EZ, £199.213; 48K internal RAM, General Northern Microcomputers, GNDMIC, 46 Middle Street, Blackhall, Hartlepool, Cleveland, £70 + VAT; 32K RAM Card Audio Computer, 87 Bournemouth Park Road, Southend-on-sea, SS5 2JJ, £40 kit, £46 built.

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REDDITCH, WORCS B97 4RU

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DATABASE Create your own files and records on tape £7.50

BANK MANAGER Computerise your bank account £5.00

SUPER BANK MANAGER A full feature version, needs 3K expansion, but will run on any memory size £7.50

M/C SOFT Machine code monitor and disassembler, any memory size £7.50

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We've tried to sort out the confusion, and the sheer numbers, to present an easily understood list for each machine. Where possible, we have eliminated duplications, so that the same tape with a different label is not listed twice. Rather it should be credited once, with as many suppliers as we could find.

Table Codes

In order to fit as many programs as possible into our pages, we have had to use codes for some columns, considerably shortening the wording.

The information given for each program is: Title, memory required to run it, company producing it,

whether tape/cartridge or disk, type and supplier and price.

The codes we have used are:

Program Type

- GM = Game
- BS = Business routine
- UT = Utility (ie. programming aid)
- DO = Domestic
- ED = Educational

How Sold

- R = Cartridge (may include memory)
- C = Tape (cassette)
- D = Disc (for expanded systems)
- L = Listing (sold as print-out)

Due to overwhelming response we have been forced to alternate machines included in our checklist each month. Out this month are the VIC, Dragon, BBC, Sharp and

TRS-80. But don't panic, they will be featured in September for you to make your software selection. You'll notice that this month we have reverted to our policy of including suppliers address. This will help you order your software immediately.

Not Here?

To companies whose products are not listed herein we can only say **TELL US ABOUT IT!** This applies particularly to the smaller retailer who may sell only half a dozen or so programs for one machine. If you produce software for any of the machines on the market today, then we would love to include your wares in our checklists. Send it in to us, marked for the attention of the Editor (in our format *Please!*) or ring Chris Palmer on 01-437 1002 as soon as possible.



REFERENCE

SOFTWARE LISTING

ATARI

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
Air Strike	Gm	English S/W	16K	C CH, HM		£15.95
Ali Baba	Gm	Quality S/W	32K	D HM		£22.95
Alien Hell	Gm	Syncro	24K	D JR		£16.95
Alien Hell	Gm	Syncro	16K	C JR		£13.95
Alpha Fighter	Gm	Dinacomp	24K	C AB, IK		£11.99
Analog Adventure	Gm		32K	D BC		£34.95
Angle Worms	Gm	Adventure Int.	8K	C AB, IK		£12.50
Ants Hill	Gm	Atari	8K	C GC	POA	
				AB		£11.25
Armoured Patrol	Gm	Adventure Int.	16K	C AB		£16.50
Arcade Baseball	Gm	Arcade Plus	16K	C JR		£18.95
Arcade Baseball	Gm	Arcade Plus	16K	D JR		£20.95
Assembler Editor	Ut	Atari		R AB, HM		£39.95
Assembler	Ut	Quality S/W	16K	C BC		£14.95
Assembler Editor	Ut	United S/W of America	16K	R BC		£34.50
Asteroids	Gm	Atari	16K	R AC, BC, CH, HM, IK		£29.95
				BC		£18.95
Atari Word Processor	Bs	Atari	32K	C AB		£95.95
Atari Word Processor	Bs	Atari	32K	C BC		£85.00
Atari Word Processor	Bs	Atari	32K	D HM		£99.95
Atari World Graphics	Ut	United S/W of America	48K	D BC		£43.95
Avalanche	Gm	Atari	16K	C GC	POA	
				CH		£13.95
				AB		£16.75
Babel	Gm	Atari	16K	C GC	POA	
				AB, IK		£16.75
Balrog Sampler	Gm	Adventure Int.	32K	C AB		£24.95
Basic A Plus	Ut	OSS S/W	48K	D BC		£52.50
Basic A Plus and Operating System A	Ut	OSS S/W	48K	D BC		£99.50
Basic Program Compress.	Ut	Atari	32K	D AB		£16.75
Basic Utility/Renumber	Ut	Atari	16K	C AB		£16.75
Basics of Animation	Ed	Santa Cruz	24K	D BC		£10.95
Basics of Animation	Ed	Atari	16K	C BC		£9.95
Basics of Animation	Ed	Santa Cruz	16K	C AB		£13.95
Basketball	Gm	Atari	16K	C AC, HM, IK		£24.50
Basketball	Gm	Atari	16K	R AB, BC, IK		£29.95
Beta Fighter	Gm	Allrian	16K	C JS		£15.50
Beneath the Pyramids	Gm	Chrystal	48K	C CH, AB, IK		£19.99
Beta Fighter	Gm	Artworx	16K	C JR		£13.95
Beta Fighter	Gm	Artworx	16K	D JR		£16.50
Black Jack	Gm	Atari	16K	C GC	POA	
				AC, BC		£8.95
				AB, HM, IK		£9.95
Black Jack Shooter	Ed	Atari	16K	C AB		£16.75
Bob's Business	Bs	Santa Cruz	16K	C AB		£9.95
Bridge 2.0	Gm	Allrian	24K	C JS		£16.00
British Heritage Jigsaw Puzzle	Gm	Thorn EMI	16K	C BC, HM, IK		£19.95
Bug Attack	Gm	Cavalier Computers	16K	C JR		£19.25
Bug Attack	Gm	Cavalier Computers	16K	D JR		£19.25
Bumper Pool	Gm	Atari	16K	C GC, IK	POA	
				AB		£11.25
Calculator	Bs	Atari	24K	D BC, IK		£16.95
Canyon Climber	Gm	Datasoft	16K	D HM		£20.00
				C JR		£18.95
				D JR		£19.25
Caverns of Mars	Gm	Atari	16K	C BC, HM, IK		£24.50
Caverns of Mars	Gm	Atari	16K	C BC, HM, IK		£24.50
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				BC, HM, IK		£29.95
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Character Generator	Ut	Data Soft	16K	C BC		£9.97
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Chrystals	Gm	Dinacomp	24K	C AB, IK		£9.99
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Controller	Gm	Avalon Hill	32K	D BH		£17.95
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Conversational French	Ed	Atari	16K	R AB, HM, IK		£39.95

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AE Vincelord Ltd Suite 2 26 Charing Cross Road London WC2 240 0213/0217	AL Acornsoft Ltd 4a Market Hill Cambridge CB23NJ 0223 316039
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Curse of Rah	Gm	Auto Simulations	32K	D JR	£13.80
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				AB,JK	£16.50
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REFERENCE

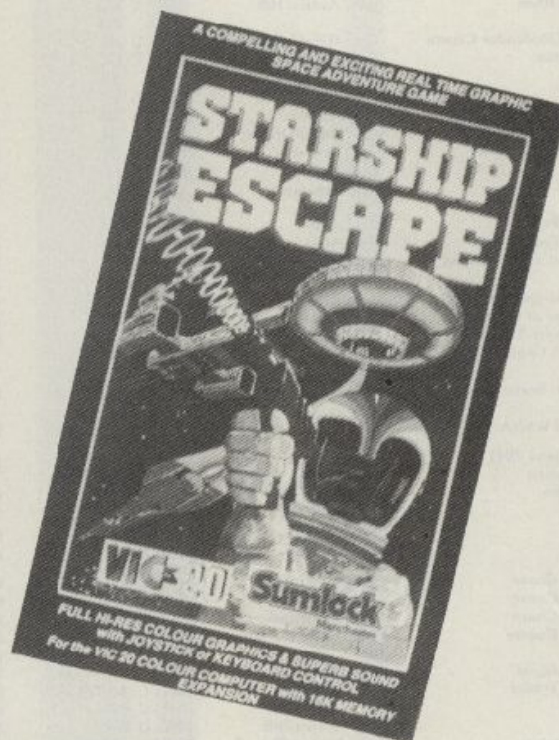
SOFTWARE LISTING

ATARI

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
Intruder Alert	Gm	Dinacomp	16K	C AB,IK		£15.99
Invasion Orion	Gm	Avalon Hill		C CB,IK		£13.25
Invasion Orion	Gm	Avalon Hill		D GB,IK		£15.75
Invitation to Prog I	Ed	Atari	16K	C AB,HM,IK		£15.95
Invitation to Prog. II	Ed	Atari	16K	C GC,IK	POA	
				AB,BC,HM		£22.95
Invitation to Prol. III	Ed	Atari	16K	C AB,BC,HM	IK	£22.95
Nautilus	Gm	Synapse	32K	C HM		£20.00
Nomino's Jigsaw	Gm	Dinacomp	24K	C AB,IK		£15.99
Norton Forth	Gm	Adventure Int.	32K	C AB		£24.95
Nuke War	Gm	Avalon Hill	16K	C BH		£10.95
Old McDonald's Farm	Gm	Adventure Int.	16K	C AB		£12.50
Operating System A Plus	Ut	OSS S/W	48K	D BC		£52.50
Outlaw Howitzer	Gm	Atari	24K	C GC	POA	
				AB		£16.75
Pacific Coast Highway	Gm	Datasoft	16K	C HN		£20.00
Pacific Coast Highway	Gm	Datasoft	16K	D HN		£20.00
Pac-Man	Gm	Atari	16K	R GC,IK	BC,HM	£29.95
Page Flipping	Ed	Santa Cruz	16K	C BC		£9.95
Page Flipping	Ed	Santa Cruz	16K	D BC		£10.95
Personal Finance	Gm	Atari		R BC,HM,IK		£49.00
Pilot (Educator)	Ut	Atari	16K	C R AB,BC,HM		£79.95
Pirate Adventure	Gm	Adventure Int.	24K	C BC		£14.95
				C AB,IK		£16.50
Planet Miners	Gm	Avalon Hill	24K	C BH		£10.95
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Program Pack I	Ut	Avalon Hill	16K	C GB		£3.50
Protector	Gm	Synapse	32K	C HN		£19.95
Purchase Ledger	Bs	Atari	48K	C AB,IK		£149.95
Pyramid of Doom	Gm	Adventure Int.	24K	C BC	AB,IK	£14.95
				AB,IK		£16.50
QS Forth	Ut	Quality S/W	24K	D BC		£44.90
Quest for Power	Gm	Chrystal	48K	C CH,AB		£26.99
Race in Space	Gm	Analog S/W	16K	C BC		£14.95
Race in Space	Gm	Analog S/W	16K	C HN		£15.95
Race in Space	Gm	Analog S/W	16K	D HN		£15.95
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Space Ace	Gm	London S/W	16K	D HM		£19.95
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Space Tilt	Gm	Dinacomp	16K	C AB,IK		£29.95
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Atom Chess	Gm	Acornsoft	12K	C GK	£11.44
Atom Forth	Ut	Acornsoft		C GA,EJ,AL	£11.50
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Atom Store	Bi	Program Power	12K	C GK	£9.15
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CE	Southern Software PO Box 39 Castleigh Hants S05 5WQ	CZ	J Wolstencroft Sagar Fold Preston Chipping (09956) 327
CF	Sigma Systems 54 Park Place Cardiff Cardiff 21515/34869	DA	Ground Control Alfreda Avenue Hullbridge Essex S55 6LT Southend (0702) 230324
CG	Planet Software 10 Norton Drive Eaton Norwich	DB	Mick Bignell 01 953 8385
CH	Brighton Game 24 Gloucester Road Brighton Sussex 0273 698424	DC	Giltrole Ltd PO Box 50 Rugby Warks CV21 4DH
CI	Picturesque 6 Corkscrew Hill West Wickham Kent BR4 9BB	DD	Deep Thought Software 20 Chauntisinger Alton Hants
CJ	7 Lidgett Crescent Roundhay Leeds	DE	Silversoft 40 Empress Avenue Ilford Essex
CK	Chrisalid 13 High Street Berkinstad Herts 74569	DF	Michael Orwin 26 Brownlow Road Willesden London NW10
CL	MED 1736 Church Hill Road Thurmaston Leicester Leicester 704492	DG	Hisoft 60 Hallam Moor Liden Swindon Wiltshire
CM	Simple Software 15 Havelock Road Brighton Sussex 0273 504879	DH	The Soft Option Bamberplan Ltd PO Box 11 Cranbrook Kent 058080 310
CN	Buffer Micro Shop 374A Streatham High Road London SW16 769 2887	DJ	Microcomputer Spacedrome 3 Westholm London NW11 01 458 5845
CO	Pixel Productions 39 Ripley Gardens London W1 4HF	DK	Spider Software 98 Avondale Road Wouth Croydon Surrey 01 680 0267
CP	Computics Microsoft 1 Bell Lane Wheatley Oxford OX9 1XY	DL	Xavier Business Systems 7 North Lane Clayton Scarborough Yorkshire (0723) 583509
CQ	KW Software 155 Ronginglow Road Sheffield S11 7PS	DM	Camden Electronics (Systems Division) 462 Coventry Road Small Heath Birmingham 021 773 8240/021 772 5718
CR	Sideline Freepost Oxford OX2 8BR	DN	Sumlock Electronic Services Royal London House 198 Deansgate Manchester M3 3NE
CS	IQ Services Canal House Ardriughais Argyll Scotland 0546 3212	DO	Microstyle 29 Belvedere Landsowne Road Bath (0225) 334569
CT	Willow Software PO Box 6 Crediton Devon EX17 1DL	DP	Small Systems Engineering Ltd 2-4Canfield Place London NW6 01 328 7145
CU	Level 9 Computing 229 Hughenden Road High Wycombe Bucks	DQ	Woodland Software 103 Oxford Gardens W10 6NF 01 960 4877
CV	J Perves 12 Stobhill Road Gorebridge Midlothian EH23 4PL		

SOFTWARE LISTING

ATOM

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
Constellation	Gm	Program Power	12K	C GK		£7.99
Constellation	Gm	Program Power	12K	C GK		£7.99
Colour Invaders	Gm	Hopesoft	12K	C JV		£3.75
Cowboy Shootout	Gm	Program Power	12K	C CH,GK		£7.99
Cylon Attack	Gm	A&F S/W	12K	C GE		£4.95
Dambusters	Gm	Program Power	10K	C GK		£5.69
Data Base	Ut	Acornsoft	6K	C EJ,FZ,FA,GA		£11.50
Death Satellite	Gm	A&F S/W	12K	C GE		£6.00
Demon Dungeon	Gm	Program Power	5K	C GK		£6.85
Derby, Blitz and Rat Race	Gm	Program Power	12K	C GK		£6.84
Desk Diary	Bs	Acornsoft	12K	C FA,EJ,AL,GA		£11.50
Detective	Gm	Computersmith	12K	C LC		£4.95
Disassembler	Ut	Hopesoft	3K	C JV		£1.75
Disassemble Program	Ut	Program Power	4K	C GK		£6.85
Dragon's Lair	Gm	Program Power	12K	C GK		£6.85
Early Warning	Gm	A&F S/W	12K	C GE		£4.95
Earth Rescue	Gm	Rucksoft	6K	C HO		£2.80
Easy Talker	Ed	Acornsoft	16K	C AW		£5.00
Escape	Gm	A&F S/W	8K	C GE		£4.95
Fall of Rome	Gm	Program Power	12K	C GK		£7.99
Forth Tape	Ut	Acornsoft		C FA		POA
Forth, Theory & Practice	Bs	Acornsoft		C AL		£6.00
Fruit Machine	Gm	Bug Byte	8K	C HO		£4.00
Galactica	Gm	Program Power	12K	C GK		£5.69
Galaxian	Gm	Bug Byte	12K	C CH,GA,GB		£8.00
Galaxian War and Invasion	Gm	Program Power	2K	C GK		£6.84
Golf	Gm	Computersmith	12K	C LC		£4.95
Golf	Gm	Bug Byte	6K	C HO		£5.00
High Stats	Bs	Program Power	12K	C GK		£7.99
Hyper Fire	Gm	Program Power	12K	C GK		£9.15
Introductory Pack	Ed	Acornsoft	3K	C GA,FA,AL		£23.00
Invader Force	Gm	Program Power	12K	C GK		£9.15
Invaders	Gm	Bug Byte	12K	C CH,GA,GB		£8.00
Labyrinth	Gm	Bug Byte	12K	C HO		£6.95
Last Run	Gm	Bug Byte	7K	C HO		£3.00
Lunar Lander	Gm	Program Power	12K	C GK		£7.99
Martians	Gm	Program Power	12K	C GK		£7.99
Maths Pack 1:	Ed	Acornsoft	4K	C EJ,FA,FZ,AL,GA		£11.50
Maths Pack II:	Ed	Acornsoft	6K	C EJ,FA,FZ,AL,GA		£11.50
Maze Ball	Gm	Program Power	12K	C GK		£5.69
Microbudget	Bs	Program Power	12K	C GK		£9.15
Mine Field	Gm	A&F S/W	6K	C GE		£4.95
Missile Command	Gm	A&F S/W	12K	C GE		£4.95
Mode 4 VDU	Ut	Program Power	12K	C GK		£7.99
Moon Lander	Gm	Rucksoft	6K	C HO		£2.25
Munchy Man	Gm	Program Power	12K	C GK		£5.69
Music Box	Gm	Program Power	12K	C GK		£7.99
Parachute	Gm	Rucksoft	5K	C HO		£2.25
Peeko Computer	Ed	Acornsoft	6K	C GA,FA,AL		£11.50
Pinball	Gm	Bug Byte	6K	C HO		£4.50
Pirate Island	Gm	Hopesoft	12K	C JV		£6.75
Polaris	Gm	A&F S/W	12K	C GE		£3.95
Polecat	Gm	A&F S/W	12K	C GE		£4.95
Pontoon	Gm	A&F S/W	12K	C GE		£3.95
Programmer's Toolkit	Gm	Program Power		C GK		£28.15
Reversi	Gm	Program Power	8K	C GK		£5.69
Rhino and Wiggle	Gm	Bug Byte	10K	C Ho		£5.00
Robot Control	Ed	Acornsoft	16K	C AW		£35.00
Robot Nim	Gm	A&F S/W	6K	C GE		£3.95
Sketch Pad Program	Gm	Program Power	5K	C GK		£5.69
Softscreen	Ut	Computer Concepts	12K	C GJ		£11.50
Space Invaders	Gm	Pro S/W	12K	C LD		£6.00
Space Fighter	Gm	Program Power	12K	C GK		£9.15
Space Invaders	Gm	Computer Concepts	12K	C GJ		£7.80
Space Adventure	Gm	Pro S/W	12K	C LD		£6.00
Space Storm	Gm	Program Power	4K	C GK		£5.69
Spirographics	Gm	Rucksoft	8K	C HO		£2.45
Star Raid	Gm	Rucksoft	11K	C HO		£3.30
Star Trek	Gm	Program Power	5K	C GK		£6.85
Star Trek	Gm	Bug Byte	12K	C HO		£5.00
Statistics Pack	Ut	Bug Byte	12K	C Ho		£20.00
Stockbroker	Gm	Program Power	5K	C GK		£4.54
Super Race Track	Gm	Program Power	12K	C GK		£5.69

SOFTWARE DEALERS

DR	Telesystems Ltd PO Box 12 Great Missenden Bucks HP16 9DD	EK	Holly Products Blackthorn House Dukes Lane Gerrards Cross Bucks
DS	Macronics 26 Spiers Close Knowle Solihull West Midlands B93 9ES	EL	I G Systems 6 Laleham Avenue Mil Hill London NW7 01 959 0106
DT	Hewson Consultants 7 Graham Close Blewbury Oxon (0235) 850075	EM	Merton Electronics 85/87 Station Road W Croydon 68) 8606
DU	Silicon Office Servies 240 Durants Road Enfield Middx EN3 7AZ 01 805 0903	EN	DeVinci Computer Shop 65 High Street Edgware Middlesex
DV	Siron Computer Systems Unit 14 29 Willow Lane Mitcham Surrey 01 640 6931	EO	Calco Software Lakeside House Kingstone Hill Surrey 01 546 7256
DW	Psion Ltd 2 Huntsworth Mews Gloucester Place NW1 6DD	EP	Richard Francis 22 Foxhollow Barhill Cambridge
DX	JRS Software 19 Wayside Avenue Worthing 65691 (evening and weekends only)	EQ	Microtek Ltd 15 Lower Brook Street Ipswich Suffolk (0473) 50512 or 52466
DY	Calisto Computers Ltd 119 John Bright Street Birmingham B1 1BE 021 632 6458	ER	Diskwise Ltd 25 Fore Street Callington Cornwall 05793 3780
DZ	Micro Gen 24 Agar Crescent Bracknell Berk 0344 27317	ES	Control Technology 39 Gloucester Road Gee Cross Hyde Cheshire SK14 5JG 061 368 7558
EA	Anglia Computer Centre 88 St. Benedicts Street Norwich NR2 4AB 0603 25002	ET	Comp Shop 311 Edgware Road London W2 01 262 0387
EB	SBD Software 15 Jocelyn Road Richmond TW9 2TJ 01 948 0461	EU	Micro Computer Products Cambridge House Cambridge Road Barking Essex IG11 8NT 01 591 6511
EC	Abacus Software PO Box 7211 Grand Rapids Michigan USA 49510	EV	GW Computers 55 Bedford Court Mansions Bedford Avenue London WC1 01 636 8210
ED	Qdos Business Software 9 Tintern Close Streety Birmingham 021 353 0058	EW	C/WP Computers 108 Rochester Row London SW1P 1JP 01 828 3127
EE	dK'tronics 23 Sussex Road Gorleston Great Yarmouth Norfolk (0493) 602453	EX	Metrotech Mail Order Waterloo Road Uxbridge Middx 0895 588111 x 274/269
EF	Computech Systems 168 Finchley Road London NW3 6HP 01 794 0202	EY	Microsystems Ltd Summerfield House Vale Guernsey 0481 473377
EG	Electronics Experts Avondale Workshops Woodland Way Kingswood Bristol BS15 1QH	EZ	Superior Systems Ltd 178 West Street S14ET 0742 755005
EH	Artic Computing 396 James Reckitt Avenue Hull HU8 0JA	FA	Control Universal Ltd Unit 2 Andersons Court Newnham Road Cambridge 0223 358757
EJ	Knights TV & Computers 108 Rosemount Place Aberdeen 0224 630526	FB	Pete & Pam Computers 98 Moyser Road London SW16 01 677 2052/7341
EJ	Microage Electronics 135 Hale Lane Edgware Middx 01 959 7119	FC	Zenith Data Systems Bristol Road Gloucester 0452 29451

Squares, Simon and Parachute	Gm	Bug Byte	7K	C HO	£5.00
Tangle	Gm	A&F S/W	6K	C GE	£3.95
The Soft VDU	Gm	Acomsoft	8K	C AY,FA,GA EJ,AL,CH,FZ	£11.50
The Park	Gm	Program Power	12K	C GK	£5.69
Time Tutor	Ed	A&F S/W	6K	C GK	£3.95
2K Programs (1)	Gm	Bug Byte	2K	C HO	£4.50
2K Programs (3)	Gm	Bug Byte	2K	C HO	£4.50
Typist	Ut	Bug Byte	6K	C HO	£4.00
Tunnel	Gm	Rucksoft	6K	C HO	£2.65
UFO Bomber	Gm	Bug Byte	7K	C HO	£4.00
Utility Pack 1	Ut	Acomsoft	2K	C FA,GA,AL,GA	£11.50
Warlords	Gm	Program Power	12K	C GK	£7.99
Word Pack ROM	Ut	Acomsoft	8K	C AJ,EJ,CA	POA
Word Processings Pack	Bs	Acomsoft	8K	C FA	POA
Word Tutor	Bs	Acomsoft	12K	C GA,EJ,FA,AL	£11.50
Write Your Own Adventure	Ut	Hopssoft	12K	C JV	£5.75
Yan	Gm	Program Power	3K	C GK	£5.69
Yellow Pearl	Gm	Rucksoft	7K	C HO	£3.30

TEXAS

3D O's and X's/Mastermind	Gm	Apex S/W	16K	C JT	£4.95
A-Maz-Ing	Gm	Texas	8K	R AB,CH	£24.00
Addition, Subtraction I	Ed	Texas	8K	R AB	£35.00
Addition, Subtraction II	Ed	Texas	8K	R AB	£35.00
Attack	Gm	Texas	8K	R AB	£30.00
Adventure Land	Gm	Texas	8K	C AB	£24.95
Battlefront	Gm	TX Software	16K	C JU	£6.00
Beginning Grammar	Ed	Texas	8K	R AB	£20.00
Blackjack Poker	Gm	Texas	8K	R AB	£24.00
Blasto	Gm	Texas	8K	R AB	£25.00
Car Wars	Gm	Texas	8K	R AB,CH	£25.00
Chequebook Manager	Bs	Texas Max	16K	D AB	£19.00
Chess File	Gm	TX Software	16K	C JU	£6.00
Connect 4	Gm	Texas	8K	R AB	£24.00
Early Reading	Ed	Texas	8K	R AB	£35.00
Editor Assembler	Ut	Texas	8K	R AB	£115.00
Electrical Eng'g Library	Bs	Texas Max	16K	C AB	£24.00
Electrical Eng'g Library	Bs	Texas Max	16K	D AB	£35.00
Extended Basic	Bs	Texas	8K	R AB	£100.00
Four in a Row	Gm	TX Software	16K	C JU	£6.00
Gamestape 1	Gm	Apex S/W	16K	C JT	£1.95
Gamestape 2	Gm	Apex S/W	16K	C JT	£3.95
Gamestape 3	Gm	Apex S/W	16K	C JT	£4.95
Ghost Town	Gm	Texas	8K	C AB	£24.95
Golden Voyage	Gm	Texas	8K	C AB	£24.95
Golf	Gm	TX Software	16K	C JU	£6.00
Graphing Package	Do	Texas Max	16K	C AB	£14.00
Graphing Package	Do	Texas Max	16K	D AB	£19.00
Hangman	Gm	Texas	8K	R AB	£24.00
Haunted House	Gm	Apex S/W	16K	C JT	£5.95
Household Money Management	Do	Texas	8K	R AB	£25.00
Hunt The Wumpus	Gm	Texas	8K	R AB,CH	£25.00
Hustle	Gm	Texas	8K	R AB	£30.00
Lunar Lander	Gm	Apex S/W	16K	C JT	£4.95
Mailing List	Bs	Texas Max	16K	D AB	£60.00
Market Simulation	Bs	Texas	32K	C AB	£9.00
Market Simulation	Bs	Texas	32K	D AB	£19.00
Maths Routine Library	Ed	Texas Max	16K	C AB	£24.00
Maths Routine Library	Ed	Texas Max	16K	D AB	£35.00
Maze/Towers of Hanoi	Gm	Apex S/W	16K	C JT	£5.95
Mind Challenges	Gm	Texas	16K	R CH	£24.95
Minimemory	Ut	Texas	8K	R AB	£89.95
Minimemory	Ut	Texas	8K	C	£89.95
Mission Impossible	Gm	Texas	8K	C AB	£24.95
Multiplication	Ed	Texas	8K	R AB	£35.00
Munchman	Gm	Texas	8K	R AB	£29.95
Music Makers	Do	Texas	8K	R AB	£35.00
Music Maker	Ed	Texas	16K	D AB	£14.00
Music Skills Trainer	Ed	Texas Max	16K	C AB	£19.00
Music Skills Trainer	Ed	Texas Max	16K	D AB	£24.00
Mystery Funhouse	Gm	Texas	8K	C AB	£24.95
Nim/O's and X's	Gm	Apex S/W	16K	C JT	£4.95
Number Magic	Ed	Texas	8K	R AB	£18.00
Oldies but Goodies	Gm	Texas Max	16K	C AB	£9.00
Oldies but Goodies	Gm	Texas Max	16K	D AB	£14.00
Othello	Gm	Texas	8K	R AB	£40.00
Personal Financial Aid	Do	Texas	8K	C AB	£9.95

SOFTWARE DEALERS

FD Commodore Information 675 Ajax Avenue Slough Berks Slough 79292	FV The Avery Computer Company 13 The Mall Bar Hill Cambridge (Crafts Hill 80991)
FE Logic Computers 31 Palmer Street London SW1H 0PR 01 222 1122/5492	FW Hilderbrey Ltd 8/10 Parkway Regents Park London NW1 01 485 1059
FF Overseas Computer Systems Cons. 182a Queens Road Watford Watford 48580	FX Micromedia Vine Cottage Tentelow Lane Norwood Green Middx 01843 9457
FG Blyth Computers Wenhaston Halesworth Suffolk 050 270 565	FY Wida Software 2 Nicholas Gardens London W5 5HY 01 567 6941
FH Taurus Computer Design 47 High Street Baldock Herts SG7 6BG	FZ Superior Systems Ltd 178 West Street Sheffield 0742 755005
FI HITEC Zollergasse 15 A-1070 Vienna Austria 01043 222 934331	GA Eltec Services Limited 231 Manningham Lane Bradford BD8 7HH (0274) 491372
FJ Graffcom Systems 102 Portland Road Holland Park London W11 01 727 5561	GB Anglo American Software 138a Stratford Court Sparkhill Birmingham 021 771 2995
FK Electronic Aids Mythe Crest The Mythe Twekesbury Glos GL20 6EB 0386 831020	GC Castle Electronics 15 Castle Street Hastings East Sussex 0424 437375
FL BUG-BYTE 98-100 The Albany Old Hall Street Liverpool	GD Quicksilva 95 Upper Brownhill Road Maybush Southampton Hants 0703 771248
FM Learning Computer Systems 37 St Andrews Drive Seaford Sussex BN25 2SB	GE A&F Software 10 Wilshire Avenue Longsight Manchester 061 320 5482
FN Jentech Services Ltd Nordley Bridgenorth Shropshire WV16 4SU 07462 5287	GF SRS Microsystems 161 Bramley Road Oakwood London N14 4XA 01 363 8060
FO Work Force 140 Wilsden Avenue Luton Beds LU1 5HR	GG Stirling Microsystems 241 Baker Street NW1 01 486 7671
FP Twickenham Computer Centre 72 Heath Road Twickenham Middx 892 7896 or 891 1612	GH Microtan Software 234 Dulwich Road London OBD 01693 7659
FQ Sbd Software 15 Jocelyn Road Richmond 948 0461	GI Lander Microsystems 32 Clockhouse Lane Collier Row Romford Essex Romford 26325
FR Beebug PO Box 50 St Albans Herts (Independent User Group for BBC Micro)	GJ Computer Concepts 16 Wayside Chipperfield Herts 09277 62955
FS RAM Computer Services Ltd 15-17 North Parade Bradford 0274 39116	GK Program Power 5 Wensley Road Leeds LS7 2LX 0532 683186
FT Ozwise Computers 28 Crofts Road Harrow Middx HA1 2PH 01 863 2309	GL Syrtis Software 23 Quantock Road Bridgewater Somerset
FU Compusense PO Box 169 Palmer's Green London N13 4HT 01 882 0681	GM Lutterworth Software 6 Cromwell Close Walcote Lutterworth LE17 4JJ
	GN Collins Computing The Gatehouse Whinburgh Dereham Norfolk

REFERENCE

SOFTWARE LISTING

TEXAS

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
Personal Record Keeping	Do	Texas	8K	R	AB	£50.00
Personal Report Generator	Do	Texas	8K	R	AB	£70.00
Physical Fitness	Do	Texas	8K	R	AB	£20.00
Pirate Adventure	Gm	Texas	8K	R	AB	£39.95
Pre-School Learning Fun	Ed	Texas	8K	R	AB	£17.00
Programming Aids I	Ut	Texas	16K	C	AB	£9.00
Programming Aids I	Ut	Texas	16K	D	AB	£14.00
Programming Aids II	Ut	Texas	16K	D	AB	£24.00
Programming Aids III	Ut	Texas	16K	D	AB	£19.00
Pyramid of Doom	Gm	Texas	8K	C	AB	£24.95
Roulette/Craps	Gm	Apex S/W	16K	C	IT	£4.95
Savage Island I	Gm	Texas	8K	C	AB	£29.95
Savage Island II	Gm	Texas	8K	C	AB	£29.95
Saturday Night Bingo	Gm	Texas Max	16K	C	AB	£14.00
Soccer	Gm	Texas	8K	R	AB,CH	£30.00
Sorcerers Castle	Gm	Apex S/W	16K	C	IT	£5.95
Speech Editor	Ut	Texas	8K	R	AB	£35.00
Statistics	Do	Texas	8K	R	AB	£45.00
Strange Odyssey	Gm	Texas	8K	C	AB	£24.95
Structural Eng'g Library	Bs	Texas	16	C	AB	£24.00
Structural Eng'g Library	Bs	Texas Max	16K	D	AB	£35.00
TI Logo	Ut	Texas	48K	R	AB	£160.00
TI Invaders	Gm	Texas	8K	R	AB,CH	£40.00
TI Trek	Gm	Texas Max	16K	D	AB	£14.00
Teach Yourself	Ed	Texas	32K	C	AB	£20.00
Teach Yourself Extended Basic	Ed	Texas	32K	D	AB	£29.00
Teach Yourself Basic	Ed	Texas	32K	C	AB	£30.00
Teach Yourself Basic	Ed	Texas	32K	D	AB	£40.00
Terminal Emulator	Ut	Texas	8K	R	AB	£57.00
The Count	Gm	Texas	8K	C	AB	£24.95
Tombstone City	Gm	Texas	8K	R	AB,CH	£40.00
Tunnels of Doom	Gm	Texas	8K	R	AB,CH	£40.00
UCSD PASCAL 4	Ut	Texas	48K	D	AB	£380.00
US Football	Gm	Texas	8K	R	AB	£24.00
Video Chess	Gm	Texas	8K	R	AB,CH	£50.00
Video Games I	Gm	Texas	8K	R	AB,CH	£25.00
Video Games II	Gm	Texas	8K	R	AB	£25.00
Voodoo Castle	Gm	Texas	8K	C	AB	£24.95
Yahtzee	Gm	Texas	8K	R	AB	£30.00
Zero Zap	Gm	Texas	8K	R	AB	£24.00

ZX SPECTRUM

3D Mazenture	Gm	Softek	48K	C	OK	£3.95
3D Tanx	Gm	dK'tronics	16/48K	C	EE	£4.95
3D Tunnel	Gm	New Generation	16/48K	C	OM	£4.95
Adventure	Gm	Foilkade	16/48K	C	ON	£5.95
Adventure	Gm	Abersoft	48K	C	HX	£9.95
Adventure 1	Gm	D J Moody	16K	C	OO	£5.00
Adventure 2	Gm	D J Moody	16K	C	OO	£5.00
Adventure 3	Gm	D J Moody	16K	C	OO	£5.00
Adventure 4	Gm	D J Moody	16K	C	OO	£5.00
Adventure Quest	Gm	Level 9	48K	C	CU	£9.90
Airline	Gm	Cases Computer Simulations	16K	C	KZ	£5.00
Alien	Gm	Spectra Soft	16K	C	JJ	£3.95
Alien Command	Gm	Microware	16K	C	OP	£4.75
Angles	Ed	AVC Software	16K	C	M	£3.00
Arcade Pack 1	Gm	Ohmega Electronics	16K	C	IO	£4.82
Arcadia	Gm	Imagine Software	16/48K	C	OR	£5.50
Aspect Assembler	Ur	Bug-Byte	16/48K	C	FL	£9.00
Assembler	Ur	Artic	16K	C	EH	£9.95
Assembler/Disassembler	Ur	Hewson	16/48K	C	DT	£8.95
Associative Database	Do	Docimodus	16K	C	HE	£15.00
Asteroids	Gm	Abbe Electronics	16K	C	OT	£5.95
Astro Scramble	Gm	C Tech	16/48K	C	OU	£2.95
Atoms	Gm	Cornhill	16K	C	JK	£5.50
Audio Sonics	Ur	Work Force	16/48K	C	FO	£4.99
Autochef	Do	Cases Computer Simulations	16K	C	KZ	£5.00
Avenger	Gm	Abacus Electronics	16K	C	OS	£4.95
Awari	Gm	Foilkade	16/48K	C	ON	£5.95
Backgammon	Gm	Microware	16K	C	OP	£5.00
Battle Of Britain	Gm	MS	48K	C	OW	£5.95
Bermuda Triangle	Gm	Kricon Ltd	48K	C	QK	£9.75

SOFTWARE DEALERS

GO	Datafax Riviera House Queens Road Buckhurst Hill Essex	HH	J K Greye Software 16 Park Street Bath Avon BA1 2TE
GP	C C Soft 83 Longfield Street Southfields London SW18	HI	John Prince 29 Brook Avenue Levenshire Manchester M19
GQ	Microx 52 The Strand Worthing Sussex Worthing 49584	HJ	Titan Programs 83 Ashwood Road Rudloe Corsham Wiltshire SN13 0LG (0225) 810132
GR	Pro Software 121 Tyn-Y-Twr Baglan Port Talbot West Glamorgan SA12 8YE	HK	Micro Computer Software Unit D6 Pear Industrial Estate Stockport Road Lower Bredbury Stockport SK6 2BP 061 494 2441
GS	Sussex Software Wallsend House Pevensey Bay East Sussex	HL	Phipps Associates 99 East Street Epsom Surrey KT17 1EA
GT	Rose Cassettes 148 Widney Lane Solihull West Midlands B91 3LN	HM	Gemini Electronics 50 Newton Street Manchester M1 061 236 3083
GU	Axis 71 Brocfield Avenue Loughborough Leics LE11 3LN	HN	The Vic Centre 154 Victoria Road Acton London W3 6UL 01-992-9904
GV	PR Software 28 The Fairway South Ruislip Middx HA4 0RY	HP	R & R Software 34 Bourton Road Gloucester GL4 0LE 0452-502819
GW	Bridge Software 36 Fernwood Marple Bridge Stockport Cheshire SK6 SBE	HQ	Town Book & Toys 15 Eastgate Street Gloucester Glos
GX	Video Software Limited Stone Lane Kinver Stourbridge West Midlands Kinver 2462	HR	Screen Scene 144 St Georges Road Cheltenham Glos
GY	J M Steadman 6 Carros Close Leighor Buzzard Beds LU7 7XB	HS	Software Masters Ltd 30 Lincoln Road Olton Birmingham
GZ	Transform Ltd 41 Keats House Porchester Mead Beckenham Kent 01 658 1661	HT	John Prince Software 29 Brook Avenue Levenshire Manchester M19
HA	Baust Computing Consultants 31 Peak Lane Fareham Hants PO14 1RX 0329 281480	HU	Nick Godwin 4 Hurkur Crescent Eymouth Berwickshire TD14 5AP
HB	University Computers 5 St Barnabas Road Cambridge CB1 2BU	HV	A Parsons 23 Coxhill Gardens River Dover Kent
HC	Educare 139a Sloane Street London SW1X 9AY	HW	Bryants (Educational) Software 1 The Hollies Chalcroft Lane North Berstead Bognor Regis West Sussex PO21 55X
HD	Simon Software Freepost New End Redditch	HX	Abersoft 7 Maes Afallen Bow Street Dyled SY24 5BA
HE	Docimodus 161 Walmersley Road Bury Lancashire BL9 5DE	HY	D.C. Roberts 107a Royal George Road Burgess Hill Sussex
HF	M C Associates 4 Granby Road Cheadle Hulme Cheshire SK8 6LS	HZ	Hard & Soft 85 Snowdown Avenue Hillingdon Middx UB10 0SE
HG	Addictive Games PO Box 278 Conniburrow Milton Keynes MK14 7NE		

SOFTWARE DEALERS

Bit, Byte Rotation	Ut	Cornhill	16K	C JK	£4.50
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ZX SPECTRUM

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PJ	Spectre 2 Mull Close Oakley Basingstoke Hants		
PK	Richard Shepard Software Freepost Maidenhead Berk SL6 5BY		
PL	Saxon Computing 3 St Catherines Drive Leconfield Beverly Humberside		
PM	Addictive Games PO Box 278 Conniburrow Milton Keynes MK14 7NE		

SOFTWARE LISTING

ZX81

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Price
Bagatelle	Gm	Cambell Systems	1K	C CN		£4.00
Bank Account	Bs	Transform	16K	C GZ		£8.75
Bank Account	Bs	Transform	32K	C GZ		£10.75
Battleships/Kami-Kazi Drive	Gm	V&H Computer	16K	C IL		£3.50
Battle of Britain	Gm	Micro Games	16K	C CN		£4.50
Beam Analysis	Bs	Hilderbay	16K	C FW		£25.00
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Breakout	Gm	Anglo American	16K	C GB		£4.50
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Brick-Stop	Gm	R & R Software	16K	C HF,HQ		£3.75
Budget & Address Book	Do	Mr Purves	16K	C CV		£4.00
Budget Programs (2)	Bs	Hilderbay	16K	C FW		£17.00
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Cassette 1	Gm	Michael Orwin	1K	C DF		£3.80
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Cassette 3	Gm	Michael Orwin	16K	C DF		£5.00
Cassette 4	Gm	Michael Orwin	16K	C DF		£5.00
ZX-Scramble						
Gunfight						
Invaders						
Galaxy Invaders						
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Fungaloids						
Life						
3D Tic Tac Toe						
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Backgammon	Gm	Psion	16K	C BC,DW		£6.95
Cassette G11	Gm	Psion	8K	C BC,DW		£4.75
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QJ Tasman
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QK Kricon Ltd
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Your Bio-Rhythms					
Catacombs	Gm	J K Greye	15K	C CN	£4.95
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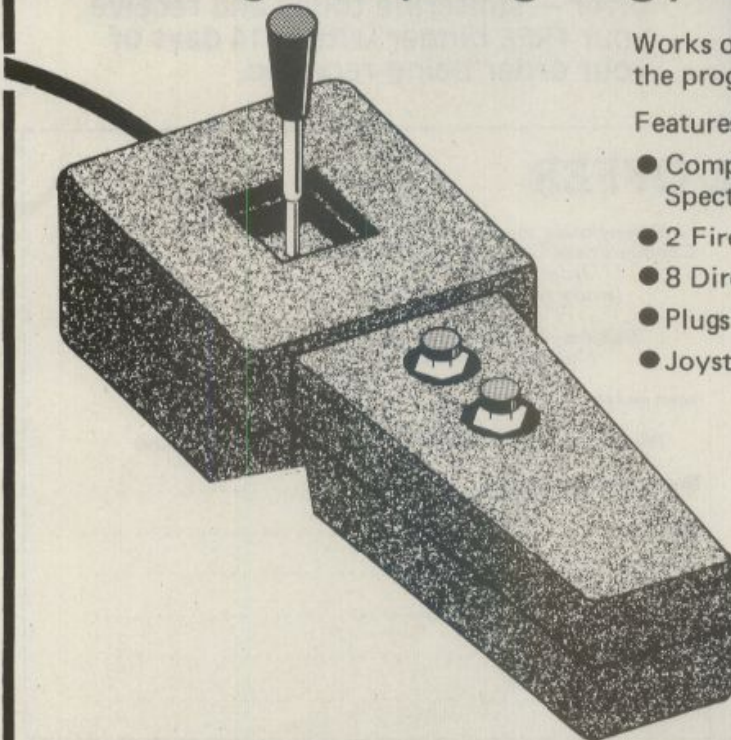


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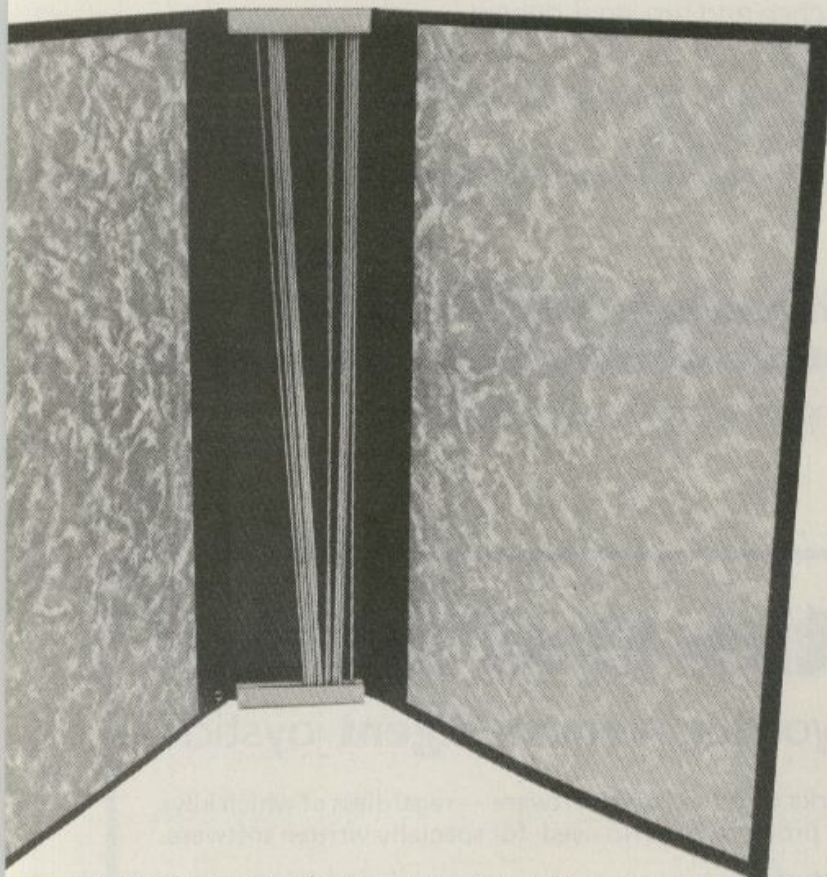
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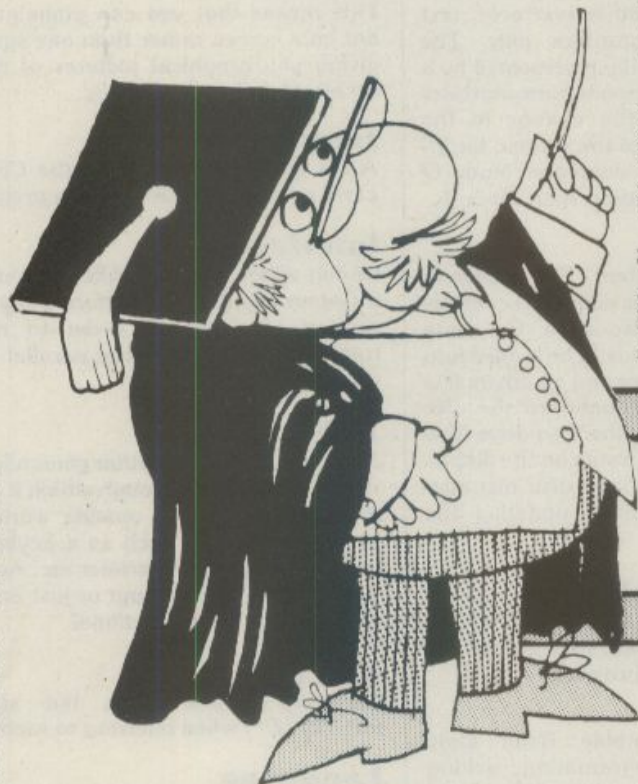
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MICROTERMS

Address

A label or name (usually a *binary* or *hexadecimal* number) specifying a particular *memory* location.

Array

A special variable that is used to hold large amounts of string or numeric information in a row and column format.

Assembly Language

Means of representing *program* statements in mnemonics and conveniently handling *memory* addressing by use of symbolic terms.

BASIC

Beginner's All Purpose Symbolic Instruction Code. An easy to learn, widely used computer language.

Bit

A single *binary* digit, representing either a 'one' or a 'zero'.

Bug

An error in *software*.

Byte

A *binary* number, usually of eight *bits*. It can represent a number from 0 to 255 (8-bit byte) as there are 256 possible combinations of "ones" and "zeros" eight bits long.

Cartridge

A self-contained unit storing either ROM or RAM which plugs into a computer to expand the memory or provide a program.

Character Set

The list of letters, numbers and symbols that you can use to write programs and display information.

CP/M

A standard disc operating system that in theory allows software packages to be run on different machines. It stands for Control Program for Microcomputers.

Cursor

Character or graphic symbol used by the computer to denote where it's printing. Also used as a prompt to input information or a command.

Data

Simply, information. The raw material that the computer processes.

Debug

To correct the errors in a *program*.

Disc

Magnetic storage device allowing fast random access to a large volume of *data*. A full-size hard disc will hold, say, 5 *megabytes* or more; a smaller *floppy disc* typically holds from 80 to 250 *kilo bytes* but in either case the capacity is being increased all the time.

Display Mode

Means of indicating the form in which the computer's output will appear on the VDU screen. It is either text only, text and graphics or graphics only. The display mode is usually represented by a number and the difference between these numbers indicates the change in the display capabilities of the screen, for instance on the BBC computer Mode 0 gives a higher resolution than Mode 1.

DOS

Disc Operating System. This refers to the piece of computer code that controls the action of the disc drive. On some machines this code has to be loaded into the machine's memory and on others it is present in the ROM onboard the disc drive. The DOS tells the disc drive how to load and save programs on the disc as well as carrying out any disc management functions such as updating the directory.

Dummy Variable

This is a variable that is defined at the beginning of a program that has no use until later on in the program.

EPROM

Erasable Programmable Read Only Memory. When programming, writing typically takes one minute and erasing, by ultra-violet light, 10 minutes or longer.

Get

A BASIC command. It tells the computer to search the keyboard and bring back the value of the first key pressed.

Gosub

A BASIC command telling the computer to go to a subroutine within a program.

Gcol

A colour command used in BBC Basic.

Hard Copy

A computer printout or listing on paper.

Hardware

All the electronic and mechanical components making up a computer system.

Hex

Shortened version of hexadecimal, meaning '6 plus 10', which is a funny way of saying 16. It refers to the number system with a base of 16. This uses 0 to 9 and then A to F of the alphabet to represent its 16 digits. Two hex digits can be conveniently used to represent a byte (eight bits).

High Resolution

This means that you can pinpoint one dot on a screen rather than one square, giving you graphical pictures of much greater detail and accuracy.

Instruction

A set of *bits* which causes the CPU to carry out a particular task in a program.

Interface

Circuit which connects different parts of a system together and performs any processing of signals in order to make transfer possible (ie serial-parallel conversion).

I/O

Input/Output. A computer generally has one or more *ports* through which it communicates with 'the outside world' — peripheral devices such as a keyboard, video display (VDU), printer etc. An I/O port may be just an input or just an output or it can be bidirectional.

Kilo (K)

Normally means 1000, but stands for 1024 (2^{10}) when referring to memory.

Language

A repertory of commands — symbols, expressions etc, used to 'call up' the instructions or procedures a processor can execute.

Location

Physical position; *memory* location is the same as *address*.

Loop

Program technique where one section of program (the loop) is performed many times over.

Machine Language (or Code)

The lowest (and most tediously detailed)

level of *program instructions*. All higher level coding must be converted to *machine language* (by *compiler* or *interpreter*) before a *processor* can obey it.

Memory Map

Chart showing how *memory* is used by a computer. The arrangement of *data* and *program* within the memory.

Menu

A set of options displayed on-screen by a computer program from which the computer user can make a selection to implement.

Modulator

A device, included in every good hobby computer, which takes the computer's output and converts it to an RF signal on a suitable TV channel, giving you a cheap, convenient visual display.

Monitor

- (1) The first level of computer *operating systems*: the *program* which turns *machine code* commands into action, managing input, output etc.
- (2) A TV-type device which is specially constructed to handle video signals from a computer that does not have a *modulator*.

Parallel / Serial

Denotes the manner in which the computer's output is sent to its peripheral devices. Serial means that the information is passed out one byte after another and it uses a system of special characters to signify control codes of the device. Parallel communications are sent out along a series of wires using the high or low state of the wire to indicate which bits are set and therefore making up a byte.

Pascal

A very powerful, structured computer language, available on a variety of microcomputers.

Peek

This BASIC command reads a value from a location in the computer memory. It can be used to access either RAM or ROM.

Peripheral

Device attached to a computer, eg *printer*, *plotter*, *disc* unit, but not necessarily essential to its use.

Pixel

The single dot that is used to create characters displayed on the VDU. Also

the smallest display unit when using high resolution graphics.

Poke

This command places a value in a location of the computer's memory. It can only be used to access RAM or control registers.

Port

Terminal which the CPU uses to communicate with the outside world.

Print At

A BASIC command telling the computer where to begin printing.

Print Out

Same as *hardcopy*.

Program

A set of *instructions*, which tells the computer to perform a sequence of tasks also called *software*.

PROM

Programmable Read Only Memory. Proms are a special form of ROM, which can be individually programmed by the user.

Qwerty

The traditional typewriter keyboard layout adopted by computer designers.

RAM

Random Access Memory. *Data* may be written to or read from any location in this type of memory.

Register

A general-purpose *memory*, or set of *memory locations*, built into the *micro-processor* itself. Sometimes, particular registers may be designated for a specific purpose.

RND

In BASIC this stands for RANDOM and instructs the computer to select random numbers, it is often used in games programs. Because the numbers thrown up are mathematically related to the number preceding they are called pseudo-random numbers, not true random-numbers.

ROM

Read Only Memory. *Memory* device which has its *data* content established as part of manufacture and cannot be changed.

Routine

A whole *program* or part of a *program* designed to perform a single function or action.

RS232

A communications *interface* used for *modems* and for serial *printers*.

Sequential File

This is a *data* file that can be created on either a disc or a cassette system. As its name suggests, the information is stored one piece after another. If this information is to be changed or modified in any way then the whole file has to be read back into memory and then written back again once the changes have been made.

Software

The different kinds of *program* required to work a computer.

Source Code

Program written in one of the *high-level languages* and requiring *compilation* into *machine language* before use.

String

A sequence of characters used in a program.

Subroutine

A part of a *program* which performs a specific task and which is available for use elsewhere in a program, as often as you like.

Syntax

The grammar of a programming language.

Tab

Really stands for tabulate and allows you to automatically put figures and/or words into columns, forming a table.

Toolkit

Name given to a piece of code that runs in a computer independantly of any other programs and adds commands to the machines language to make the process of programming or debugging easier. Commands such as Renumber, Auto and Trace are common in toolkits. Toolkits take the form of a program that is loaded into the machine on power-up or a chip that is inserted on the circuit board which is then initialised by a SYS or USR call from the operator.

Variable

A symbol used in programming which is assigned a numeric memory address. You can change the value of variable at will to suit the program you are writing.

VDU

Visual Display Unit. Usually a TV set in hobby computers, but may be a video monitor which accepts the output directly from the computer.

Z80

Widely used microprocessor. It is used in the ZX81, Spectrum and TRS-80.

6502

Another widely used microprocessor. It is the heart of the PET, Apple and Atari computers.

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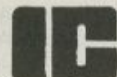
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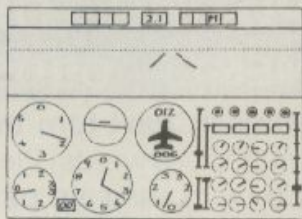


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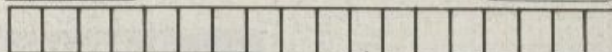
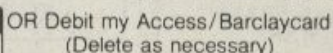


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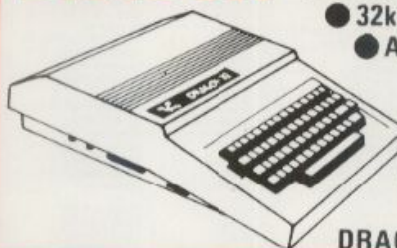
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